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SUMMARY OF RECENT ABSTRACTS*

IX. LEPROSY†

General: Epidemiology

An account of the 7th International Congress of Leprology, held in Tokyo in 1958, is given on p. 536, and an account of the 6th All-India Leprosy Workers' Conference, Gorakhpur, on p. 537. Both should be read in full; the scope of each was very wide. RICHTER and TAT (p. 620) refer to leprosy in Turkey, which is most common in the south-east and east. An account is given of leprosy in Ethiopia (p. 948) where it is a major problem; treatment is provided at various hospitals and clinics. SCHALLER (p. 1033) estimates the incidence in Ethiopia at 1·5%, highest in the central region at high altitudes (over 4·9%); the child index is relatively high but the lepromatous index is relatively low. In discussing the factors influencing the epidemiology of leprosy in Uganda BROWN (p. 839) suggests that climate, density of population and overcrowding are of secondary importance. Susceptibility is greatest in isolated communities and may be related to intermarriage; it is probably a genetic character but is not dependent on a single gene. An intensive survey of the Balovale District of Northern Rhodesia showed an incidence of 11·85 per 1,000, and WORSFOLD (p. 445) emphasizes the importance of familial contact.

CHENEVEAU (p. 454) gives an account of the leprosy work of the *Service Général Mobile d'Hygiène et de Prophylaxie* in French Equatorial Africa, where the incidence of leprosy varies from 1·6 to 5·1% in the various provinces. Treatment is given either by mouth or in the form of injections of slow-absorption suspensions of DDS. The organization is extensive and the results have been very good. In 1957 there were some 300,000 known leprosy patients in the Belgian Congo, where a symposium on the histopathology of leprosy was held under the auspices of FOREAMI in 1958 (p. 540); the review

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1959, v. 56. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

† For previous articles on leprosy in this series see the November issues of the *Tropical Diseases Bulletin* each year since 1939.

should be consulted for details. LEITE *et al.* (p. 1246) give an account of leprosy in Angola, and of the organization developed to deal with it.

A special leprosy number of the *Indian Journal of Dermatology* is reviewed on p. 539 where it is stated that in Calcutta leprosy is seen in 1 or 2 of every 10 patients with skin conditions. In a Rangoon hospital LEWIS and EDWARDS (p. 838) found leprosy most frequent at age 10–14, and in Indians; it was less common in Burmese and least in Chinese, but the lepromatous type rate was in the reverse order. MIQUEL (p. 628) describes the leprosy campaign of WHO in Thailand, where an incidence of about 1% has been found; about one-third of the patients are lepromatous. KITANO (p. 1138), who puts the incidence of leprosy in Japan at 1·46 per 10,000, comments that it appears to be nearing the end of its course in Gifu prefecture, though still high in Koreans living there. In Portuguese Timor, Indonesia, the incidence of leprosy is estimated at 0·8–1·9 per 1,000 (FRAGA DE AZEVEDO *et al.*, p. 1240). RUSSELL (p. 1240) estimates that in the Territory of Papua and New Guinea the rates per 100,000 are 27 for lepromatous leprosy, 99 for tuberculoid, 0·84 for borderline and 0·13 for indeterminate. LONIE (p. 1035) gives an account of leprosy and its introduction in the South Pacific. PRICE (p. 1035) calculates the incidence of leprosy in American Samoa at 5·3 per 1,000.

The disease is still found in Martinique, though MONTESTRUC *et al.* (p. 1034) note an encouraging diminution in the proportion of new lepromatous cases. Most of the subjects with open disease are now in hospital; DDS remains the most satisfactory drug; BCG is used in prophylaxis. In Asunción, Paraguay, DE GONZÁLEZ *et al.* (p. 445) found an incidence of 3 per 1,000, with tuberculoid at 39% rather more common than the other two forms.

Aetiology

Morphology

YAMAMOTO *et al.* (p. 447) describe the electron microscope appearances of ultra-thin section of lepra cells and *Myco. leprae*; details should be sought in the original. DE SOUZA-ARAUJO (p. 840) gives an account of the morphology of *Myco. leprae* as it appears on electron and phase-contrast microscopy. OOTAKA *et al.* (p. 1140) describe a method of staining which differentiates between tubercle bacilli and leprosy bacilli; details are given in the original abstract.

Tissue culture

HANKS (p 53) discusses the assay of the fate of mycobacteria (such as human or rat leprosy bacilli) in tissue cultures; the paper should be read in full. RANADIVE *et al.* (p. 620) show that fibrocytes from spinal ganglia of human embryos, in tissue culture to which lepromatous tissue was added, became full of acid-fast rods, but that similar cultures of skeletal muscle did so only very rarely. MORRIS and NAKAMURA (p. 1139) show that human leprosy bacilli can be taken up by the cells in various types of tissue culture, but they found no evidence that the bacilli multiplied.

Animal experiments

CHATTERJEE (p. 844) used tissue-free leprosy bacilli from untreated lepromatous subjects for inoculation into hybrid black mice, and observed undoubted

multiplication and spread to various organs. The resulting infection was massive, and it was passed in series as far as the third passage. BERGEL (pp. 449, 733, 1139) maintained rats on a pro-oxidant diet (particularly rancid linseed oil) and inoculated them with human leprosy material, continuing subinoculation in series; he describes the preparation of potent lepromin from material from the testis of a rat in the third re-inoculation series. This is the first time that a lepromin containing the human leprosy bacillus has been prepared from an experimental animal.

KELKAR and RANADIVE (p. 543) failed to infect rats or mice with *Myco. leprae,* even though treated with cortisone or hyaluronidase, or sensitized with lepromin, but they claim success with golden hamsters irradiated and treated with cortisone. The bacilli had apparently multiplied in the tissues of the hamsters. BINFORD (p. 1247) succeeded in causing granuloma formation in golden hamsters inoculated with human lepromatous material; some had been irradiated and some not. The granulomas closely resembled leprosy lesions. GUNDERS (p 56) reports progressive infection after human lepromatous tissue had been inoculated by various routes into a chimpanzee; after 14 months there was a general tendency for the lesions to regress.

Lepromin: Tuberculin: BCG

HANKS (p. 448) discusses the questions of hypersensitivity and immunity relating to the antigens of the leprosy bacillus. The paper should be read in full.

It has formerly been reported that injection into persons with tuberculoid leprosy of an antigen prepared from normal skin will produce a late reaction similar to that produced by injection of lepromin, and DAVEY and DREWETT (p. 450) confirm that this is so. The normal-skin antigen does not produce the early (Fernandez) reaction, and the late (Mitsuda) reaction is not so extensive as when lepromin is used. Further work is needed to clarify the position.

TARABINI (p. 842) found that lepromins from different countries differed from one another, and lays down rules for preparation.

OLMOS CASTRO and ARCURI (p. 450) prepared an antigen by grinding lepromatous tissue (heated for 30 minutes at 100°C.) in chloroform, extracting with water and sterilizing by heat. It is called "leprolina proteicea total" (LPT) and was found to give reactions like those produced by lepromin. GUINTO and WADE (p. 1241) prepared lepromin antigens in different ways and used one of them in various dilutions. Details should be sought in the original, but one conclusion was that for routine testing in the field a dilution of 1 in 10 would be unsuitable. On the other hand, a 1% suspension of lepromin in lanoline and liquid paraffin was used by BROWN and STONE (pp. 729, 1037) as a multi-puncture test with the Heaf apparatus. This is quite satisfactory in detecting weak reactors and furnishes a depot which continues to be active long enough to function as an indicator if BCG is given later, when lepromin and tuberculin tests are found negative in infants born of leprous mothers. BROWN (p. 451) also notes that strongly positive results were obtained in lepromatous patients tested with tuberculin (PPD) but the lepromin and tuberculin tests did not always correspond. He discusses depot lepromins and notes that if by using BCG persons negative to lepromin can be converted to the positive state, their chance of contracting leprosy is reduced, and that if the disease does occur it is likely to be relatively mild.

ARVELO *et al.* (p. 622) note that dilutions of lepromin (1 in 400 or more) do not provoke the Fernandez (early) reaction, but may provoke the Mitsuda (late) reaction in a proportion of Mitsuda-positive subjects. These dilutions can be used in place of standard lepromin for subjects known to react strongly, but not for first tests.

KOOIJ and RUTGERS (p. 451) tested leprosy patients, contacts, tuberculous patients and controls with lepromin, tuberculin and killed BCG, to investigate cross-hypersensitivity (which was slight). If cross-immunity was identical with cross-hypersensitivity it might be regarded as slight, but the authors say that it is difficult to draw conclusions of this kind from this work. In a discussion of the relationship between leprosy and tuberculosis SHORT (p. 1140) makes the point that leprosy bacilli and tubercle bacilli are both antigenic and allergenic, tubercle bacilli being the stronger agents, and producing both tuberculin and lepromin conversion. The leprosy bacillus produces inconstant lepromin conversion and no tuberculin conversion, and it is in the persistently negative lepromin reactors that lepromatous leprosy develops. Tuberculous infection seems to protect against leprosy, and the use of BCG is likely to be valuable in prevention. TRAPPMANN (p. 622) tested healthy contact children with lepromin and tuberculin, finding more positive results with lepromin in early life. BCG led to positive Mitsuda tests, and may therefore be useful in prevention.

DOULL *et al.* (p. 1242) observed that rather more tuberculin-positive children reacted to lepromin than was the case with tuberculin-negative children. The relationship between these reactions is still obscure, and other factors than mycobacterial infection may be involved.

BCG inoculation resulted in positive lepromin and tuberculin tests in over 70% and over 80% of children previously negative to those tests, but YANAGISAWA *et al.* (p. 949) found that injection of lactate solution as a placebo instead of BCG had a similar effect in 46% and 51% respectively.

Leprosy is rare in Chile (though positive lepromin tests are common in children), and tuberculosis is common; VIEL and DELLIEN (p. 1243) found that BCG vaccination of children negative to both tuberculin and lepromin usually resulted in converting both tests to positive. They conclude that the absence of leprosy may be due to the prevalence of tuberculosis, and that where leprosy is a problem its eradication may be hastened by using BCG. YANAGISAWA (p. 1244) shows that in children of lepromatous parents 47% of those children who were tuberculin-negative and did not receive BCG became leprous, against 5% of those originally tuberculin-positive and 1·5% of those originally tuberculin-negative but who received BCG. They think that BCG may prevent the development of leprosy even if given after infection has taken place. In Cayenne, where leprosy is endemic, FLOCH and MAILLOUX (p. 55) report that BCG inoculation apparently provoked the appearance of tuberculoid leprosy in 6 children, who had presumably been incubating the disease; the BCG probably acted by raising their resistance and provoking local tissue reactions.

Tests

DE ALMEIDA (p. 1037) notes that several preparations from strains of tubercle bacilli have satisfactory properties for use as antigens in complement-fixation tests for leprosy. He discusses these. LUNDIN and ROSS (p. 841)

show that in patients with active leprosy serum proteins and electrolytes tend to be abnormal.

Gamma globulin tends to be high in serum in lepromatous leprosy, and alpha globulin high in severe tuberculoid leprosy, and ARU (p. 728) suggests that these changes are sensitive indicators of severity. In leprosy the (modified) formol gel test tends to be positive, especially where renal complications, hepatic disturbances and lepra reactions occur (TARABINI and GUILLÉN, p. 842).

BUSH (p. 621) found C-reactive protein in the serum of a high proportion of leprosy patients, especially in lepromatous disease, and TERENCIO DE LAS AGUAS (p. 842) shows that it becomes less as the patient advances towards recovery.

False positive reactions with cardiolipin antigens are common in leprosy, but not with the TPI test (PLANCHET, p. 622). CANNEFAX *et al.* (p. 728) found few positive results with TPI and Reiter protein complement-fixation tests in presumably non-syphilitic leprosy patients, but more with TPCF and especially with the VDRL and Kahn tests. Similarly BREÑA and MALACARA (p. 949) found over half of a group of leprosy sera positive to the usual tests for syphilis, but only 13·4% positive to the Reiter protein complement-fixation test.

LUNDIN and ROSS (p. 1241) used the bromsulphthalein test; the results indicated some impairment of liver function in a few cases, but there were indications that a positive icteric index could be found when the bromsulphthalein test was positive.

BRUN *et al.* (p. 728) describe 2 new iontophoresis methods for the diagnosis of leprosy where sweating is defective.

TARABINI and TERENCIO (p. 452) show that the haemagglutination test is not of value in diagnosis, but is useful in assessing progress.

Clinical findings

CONTRERAS *et al.* (p. 841) studied the basic amorphous substance in the dermis of leprosy patients. COCHRANE and KHANOLKAR (p. 625) think that dimorphous leprosy is more common than was thought, and that infection takes place through the skin, the bacilli being taken up by the Schwann cells and eventually escaping into the skin. They suggest further research.

In examination of scrapings from various tissues in lepromatous and dimorphous leprosy BROWNE (p. 1142) found the highest bacteriological index in the nasal mucosa, and noted that bacilli tended to be found there, and at the edge of the lesion and the ear lobe, when other sites had become negative after treatment. In commenting on the various tissues affected by leprosy BRAND (p. 1240) suggests that the determining factor is variation in temperature—for instance in nose, ear and testis. There is probably an optimal temperature for the bacillus, just below body temperature. The author discusses the subject in relation to hair follicles and nerves.

SHARMA and SHRIVASTAV (p. 447) found enlarged lymph glands in 95 of 155 leprosy patients; in lepromatous leprosy they usually found acid-fast bacilli.

JUNNARKAR (p. 448) investigated the question of pulmonary lesions in leprosy by examination of autopsy material, but although he found ulcerating lesions of the upper respiratory tract in 16 of 20 subjects, there was no evidence of

leprous lesions in the lungs. 7 patients had tuberculosis of the lungs. Acid-fast bacilli in sputum might be tubercle bacilli or might come from the ulcers of the upper respiratory tract, or might be a manifestation of generalized bacteraemia. GOKHALE *et al.* (p. 448) report the finding of *Myco. tuberculosis* in the sputum of some leprosy patients, and discuss the differentiation from *Myco. leprae*; leprosy of the lungs is a controversial subject, and in some of these cases the diagnosis of tuberculosis was supported by radiography and culture.

SOMERSET and SEN (p. 305), in discussing the prognosis of the eye lesions of leprosy, point out that efficient local treatment is the most important measure, and the help of an ophthalmologist is essential.

BRESANI SILVA (p. 623) has published a long thesis in which he analyses the findings in 477 leprosy patients with affections of the nerves. The original abstract contains considerable detail. PRICE (p. 445) discusses the innervation of the hand in relation to leprosy, noting that it is anomalous in 20%. He (pp. 729, 1143) describes the development of plantar ulcers in leprosy, and the means advised to prevent them.

In discussing the factors which determine the onset of leprosy TARABINI and TERENCIO (p. 446) mention stress as important, and link this up with the suprarenal glands and their activity. With CONTRERAS and GUILLÉN (p. 446) they associate the lepra reaction with stress, and explain their conception of the influence of this on the hormone system and on resistance. In their own institution the numbers of reactions have decreased in recent years, and so have the deaths. TARABINI and HERNÁNDEZ (p. 844) noticed that lepra reactions in female patients were related to the menstrual cycle, and therefore used Triamcinolone in treatment, with some good results. In leprosy patients in reaction GOKHALE and KURKURE (p. 620) found evidence of impaired kidney function.

From a study of erythema nodosum leprosum DAVISON (p. 730) concludes that it is of bad prognostic significance; it depends on the duration of treatment rather than on the degree of bacterial positivity.

Treatment

In Uganda BROWN and BLENSKA (p. 733) note that in-patients with tuberculoid or indeterminate leprosy achieve discharge more quickly than out-patients, and they emphasize the importance of treatment villages built by the community to enable the more infectious and those who live at a distance to obtain adequate treatment.

At Culion and Central Luzon RODRIGUEZ (p. 1244) reports relapses in 3–13% of lepromatous patients, and notes that absenteeism during treatment was a feature. All lepromatous patients should receive sustained treatment for at least 5 years whether bacteriologically negative or not.

Various leprosy institutes exist in U.S.S.R., and considerable research is being carried out; SHUBIN (p. 541) points out that treatment with DDS and Sulphetrone is becoming the basic factor in the campaign.

JAMISON (p. 1144) gives an account of the progress and organization of DDS treatment in part of Northern Nigeria. It is very successful and new cases are predominantly non-lepromatous, though lepromatous changes sometimes occur in patients formerly diagnosed as non-lepromatous. It is good

policy to keep patients on treatment at out-patient clinics for as long as they will come.

SCHNEIDER *et al.* (p. 731) found that when DDS was suspended in a solution of carboxymethylcellulose (0·2%) the suspension caused little irritation on injection, and absorption of the DDS was satisfactorily slow, so that injection need be given only twice (or even once) a month. It withstands the tropical sun better than agar suspension and is less irritating.

DE MONTAIGNE and HILL (p. 621) found a degree of anaemia in leprosy—largely hypochromic and normocytic—which they attributed to sulphone treatment. They also investigated clotting time and other features. SMITH and ALEXANDER (p. 626) found Heinz bodies in the blood of patients taking DDS, and some of them developed haemolytic anaemia. Examination for these bodies is a simple and useful test for patients taking DDS.

JOPLING (p. 1147) describes a patient who developed erythema nodosum leprosum and foot-drop while on DDS treatment; corticosteroids given by mouth and injected with hyalase into the nerves were followed by recovery of the affected foot.

LAVIRON *et al.* (p 54) use small doses of DDS, thiacetazone and chaulmoogra oil, combined into one preparation, and given weekly by injection: they write favourably of this combination and consider that there is a synergic action. DAVISON (p. 1145) writes favourably on the triple treatment of tuberculoid leprosy with DDS, Fouadin and mepacrine; details are given.

FLOCH and MAILLOUX (p. 731) found mono-isopropyl sulphone as valuable as DDS, but with the additional advantage of being very well tolerated. SATAKE (p. 1145) writes favourably on an acetylated preparation of DDS as being effective and less toxic than DDS.

NAYLOR (p. 1245) discusses the action of sulphones on the metabolism of mycobacteria.

DAVEY (p. 1245) uses DDS as a control in testing new drugs, and uses a system of enumerating leprosy bacilli and noting their condition. He found 3 new drugs useful—Ciba 1906, diaminodiphenyl sulphoxide (DDSO), and Etisul. DAVEY and HOGERZEIL (p. 542) note that Etisul is given by inunction. It has the disadvantage of an unpleasant smell. It was found particularly useful when given together with DDS, and it is cheap. The report is very favourable. DAVEY (p. 1146) found no signs of toxic action in 133 patients treated with it. It has a powerful therapeutic action in the first 2–3 months and is particularly useful when followed by standard treatment. Certain treatment programmes are suggested.

FLOCH and MAILLOUX (p. 55) record a definitely favourable action of cycloserine in lepromatous leprosy, though it cannot be considered as a substitute or DDS, and it does not prevent the lepra reaction. DE ALMEIDA NETO and REVELLES (p. 453) think that it acts directly on *Myco. leprae* and suggest that it should be given together with sulphones. Resistance has not yet been encountered. CHAMBON *et al.* (p. 627) observed that in lepromatous patients cycloserine provoked violent reactions, which could be controlled with hydrocortisone or phenylbutazone, and that the result of the reactions was beneficial.

SÉRIÉ and SCHALLER (p. 626) found that para-amino-salicylate of isoniazid gave some good results in tuberculoid leprosy, but in lepromatous disease its value was more doubtful.

FLOCH and MAILLOUX (p. 626) observed that when certain antibiotics—Rovamycin and erythromycin—were given with sulphones the results were better than with sulphones alone. SATANI *et al.* (p. 732) used Actinomycin by intradermal injection, finding it useful in macular leprosy. It seems to act on the host tissues rather than the bacilli.

SCHNEIDER *et al.* (p. 1146) used sulphamethopyrazine, which has given favourable results in tuberculosis, in a few leprosy patients. The drug was not toxic and did not lead to the lepra reaction, and it appears to be promising.

DOULL *et al.* (p. 844) found that the addition of nicotinamide and BCG to treatment with DDS did not improve the response of lepromatous patients. BLANC (p. 168) gives an account of *Myco. marianum*; it is not the causal organism of leprosy, but it is claimed to be better than BCG for changing the lepromin status, and to have some therapeutic value. On the other hand, after an extensive trial BECKETT (p. 453) concluded that marianum antigen is of no value as an adjunct to DDS in the treatment of lepromatous leprosy.

SUSMAN (p. 452) comments on erythema nodosum leprosum in patients in Ghana, which was equally frequent whether the patients were on DDS, Sulphetrone or thiacetazone. Stibophen was only palliative, but corticotrophin gave dramatic improvement. THANGARAJ (p. 730) has found amodiaquine more useful than potassium antimony tartrate in the lepra reaction.

MANEY *et al.* (p. 627) found intra-arterial Hydergine (a derivative of ergot which produces vasodilatation through action on the sympathetic) useful in trophic ulcer, and PHAM KIM LUONG *et al.* (p. 1038) treated perforating ulcers of the foot with implants of placental tissue, and record some good results.

Control

BAETA (p. 1148) gives an account of the campaign against leprosy in Brazil, and at a conference on control at Belo Horizonte (p. 629) various speakers discussed incidence, isolation, preventoria, treatment and other relevant subjects.

WARDEKAR (p. 1246) describes the method of leprosy control in an area of India by means of survey, education and treatment. Yearly survey and early treatment are important. An instance in which 4 of 5 children of a woman who had lepromatous leprosy were found to be infected is quoted by MUKERJEE and GHOSH (p. 52), who emphasize the danger to young children.

HEEREN (p. 55) describes a nursery attached to a leprosarium in the Congo, where infants are partially isolated from leprous parents, and where no leprosy has been found in the 296 children admitted.

Murine leprosy

CHANG (p. 1148) gives an account of the course of murine leprosy, which should be read in full.

CHAPMAN *et al.* (p. 734) describe the fine structure of *Myco. leprae-murium* as observed under the electron microscope. HILSON and ELEK (p. 168) discuss the intratesticular growth of *Myco. leprae-murium* in rats and mice treated with suramin. ROBSON and SMITH (p. 734) describe the course of intracorneal infection of mice with *Myco. leprae-murium*. At first the number of bacilli quickly diminishes, but after about a week it increases rapidly for a time. The number of bacilli corresponds with the macroscopic size of the lesion, and the value of drugs in treatment can be assessed by observing the size.

WALLACE (p. 306) shows that leucocytes from rats infected with *Myco. leprae-murium* were capable of transferring hypersensitivity to normal guineapigs.

HADLER and ZITI (p. 456) observe that DDS is bactericidal in murine leprosy and acts best in the later stages; dihydrostreptomycin is bacteriostatic and acts best in the earlier stages. NISHIMURA *et al.* (p. 1149) could not find that cycloserine was useful. Kanamycin was found by KAWAGUCHI *et al.* (p. 58) to be less useful than isoniazid in mouse leprosy, and HIRANO and his colleagues (pp. 56, 1149) found evidence of considerable action against murine leprosy in various hydrazone compounds; they used one with some success in murine leprosy, but do not think that it can have a marked success in human leprosy.

HANKS (p. 456) discusses the immune response elicited in animals by injection of killed and attenuated mycobacteria; BCG with killed *Myco. leprae-murium* gives a high degree of protection against challenge with *Myco. leprae-murium*. The paper should be read in full. But although BCG confers undoubted protection again challenge with *Myco. leprae-murium* in rats, HADLER and ZITI (p. 457) show that this is not the case with hamsters, in which BCG has a somewhat harmful effect.

SUSHIDA and YAMADA (p. 950) show that heat-killed murine leprosy bacilli in olive oil or liquid paraffin have considerable effect when used as a vaccine in mice; they relate this to changes in serum proteins. *Charles Wilcocks*

MALARIA

In this section abstracts are arranged as far as possible in the following order:—Human malaria—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control;* Animal malaria—*monkeys, other animals, birds.*

MAFFI, M. La malaria nelle regioni del Mudugh e della Migiurtinia, Somalia. [**Malaria in the Mudugh and Mijurtina Regions of Somalia**] *Riv. di Malariologia.* 1960, June, v. 39, Nos. 1/3, 21–118, 5 maps (2 folding) & 10 figs. on 8 pls. [Numerous refs.] English summary.

This is a profusely illustrated report of a survey in that part of Somalia which lies in the Horn of Africa between the Gulf of Aden and the Indian Ocean. Some three-quarters of the population of 224,000 follow nomadic habits and they are much less easily accessible than the inhabitants of the territories further south, around the Juba and Webi Shebeli rivers, where malaria has been investigated by other workers.

The author discusses the topographical and other regional features which are relevant to the incidence and spread of the disease; the parasite is mainly *Plasmodium falciparum* carried by *Anopheles gambiae*. He concludes that

eradication is a practical proposition if the programme is planned and carried out to embrace the whole of the Horn of Africa, including what was until recently British Somaliland and those neighbouring parts of Ethiopia which have similar malariological features.

The disease in these territories is epidemic and only to a lesser degree endemic and reliance will have to be placed mainly on mass treatment for its control.

Maffi gives an account of, and illustrates, the "geological" type of well which is now being constructed in numerous localities to replace the more primitive sources of water supply which are known as "tanks" in the Haud. Such improvements have an important and obvious bearing on the control of malaria. *J. Cauchi*

OTSURU, M.; OHMORI, Y. **Malaria Studies in Japan after World War II. Part I. Epidemiological Aspects of Postwar Malaria** [OTSURU]. *Japanese J. Exper. Med.* 1960, Feb., v. 30, No. 1, 23–32, 4 figs. [14 refs.] **Part II. The Research for *Anopheles sinensis* Sibling Species Group** [OTSURU & OHMORI]. *Ibid.*, 33–65, 13 figs. [32 refs.]

I. The first paper gives an account of the history of malaria in Japan during the present century. Benign tertian malaria was indigenous in all parts of Japan, including the northernmost island of Hokkaido, up to the end of the 19th century, and many people over 60 years of age have experienced the fever known as *okori*, or can recollect the prevalence of the disease in their childhood. The number of malarial patients declined from some 200,000 in 1903 to about 90,000 in 1920, and to 20,000–26,000 per year over the period 1934 to 1938. Only 66, 47 and 33 cases were reported in the years 1955, 1956 and 1957.

Indigenous malaria was replaced in importance by malaria imported from abroad between 1937 and 1950, especially during repatriation of soldiers and others in 1945 and 1946. Benign tertian malaria was epidemic in a number of small areas between 1945 and 1950, outside the recognized area of indigenous malaria, and malignant tertian was also identified during one epidemic in 1946. Sporadic malaria has been recorded in drug (*wake-amin*) addicts since 1951, infection (by *Plasmodium vivax*) being by inoculation by syringe. This drug addiction increased after the war.

The decline in indigenous malaria during the present century, and the subsequent decline in imported malaria, is attributed to land improvement resulting in a reduction of the population of *Anopheles sinensis*, and to the improvement of hygienic conditions and the large scale production of quinine in the 1920s.

II. *Anopheles sinensis* is the only vector of malaria in Japan and appears not to be very susceptible to infection. In the second paper, the taxonomy and distribution of 4 species of the *sinensis* group of *Anopheles* are described. Of the four species—*A sinensis, A. lesteri, A. yatsushiroensis* and *A. sineroides*—*A. lesteri*, which lays narrow-decked eggs, is believed to be possibly a more important vector than *A. sinensis* [see also this *Bulletin*, 1959, v. 56, 341].

B. R. Laurence

SENEVET, G., ANDARELLI, L. & REHM, G. Présence d'*Anopheles sergenti* (Theobald, 1903) sur le littoral méditerranéen dans la région d'Oran. [*A. sergenti* **on the Mediterranean Coast near Oran**] *Arch. Inst. Pasteur d'Algérie*. 1960, June, v. 38, No. 2, 327–8.

HANNEY, P. W. **The Mosquitos of Zaria Province, Northern Nigeria.** *Bull. Entom. Res.* 1960, Apr., v. 51, Pt. 1, 145–63, 8 figs. [12 refs.]

The studies reported here were carried out within a 50-mile radius of Kaduna in Northern Nigeria. A total of 86 species and varieties of mosquito are recorded from Zaria Province, where the climate is characterized by a well marked rainy season between April and October, and a dry season from November until March. There is an increased incidence of malaria during the wet season. During the dry season 200 children up to 10 years old were examined for malarial parasites and 87% were found to be infected. All the children from 2 villages were infected.

Mosquitoes were collected by space spraying in huts, by entry and exit traps, and by biting catches on human bait. *Anopheles gambiae* and *A. funestus* comprised almost the total anopheline daytime resting population in huts but *A. nili* and *A. wellcomei* were collected in numbers biting man indoors. The percentage of females of *A. gambiae* and *A. funestus* infected with sporozoites was approximately the same, 6·7% and 7·7% respectively during the rainy season, and approximately halved during the dry season: 4% and 3% respectively for each species. No infection was found in either *A. nili* or *A. wellcomei*.

Comparison of biting catches on human bait in huts and 10 yards away outside showed that approximately twice the number of *A. gambiae* were caught outside as inside the huts but that more *A. funestus* were captured inside the huts than outside.

A. funestus was found to be the dominant species resting in huts during the wet season in one area 20 miles north of Kaduna, and also occurred in numbers during the dry season. *A. gambiae* was found to be the predominant species resting in huts during the rainy season in villages 2 miles south of Kaduna, but a few females of both *A. gambiae* and *A. funestus* were recorded also during the dry season.

Both *A. gambiae* and *A. funestus* entered huts mainly between 21.00 and 23.00 hours and most left between 3.00 and 5.00 hours. The maximum biting activity for *A. gambiae* was between 24.00 and 5.00 hours, and that of *A. funestus* between 23.00 hours and dawn. Nearly two-thirds of the females of these two species leaving huts between 1.00 and 5.00 hours were found to be unfed.

Notes are also given on the other species of mosquitoes found in this part of Nigeria. *B. R. Laurence*

SHARMA, B. P. & CHAUHAN, N. S. **An Entomological Survey (Malaria) of Kangra District, Punjab.** *Bull. Nat. Soc. India for Malaria & other Mosquito-Borne Dis.* 1959, July, v. 7, No. 4, 125–30, 1 map.

Kangra district extends from the foot of the Himalayas to the plains of the Punjab and is mountainous with numerous ravines and streams which provide

ideal places for anopheline breeding. Following reports of malaria cases in the district in the spring of 1957, a survey was conducted in April and May 1958. Of the species of anophelines collected from sprayed and unsprayed areas in the district, *Anopheles maculatus* had the highest density (3·78 per man-hour in unsprayed areas and 2·76 in sprayed areas). *A. fluviatilis,* the likely vector, had densities of 2·39 and 0·78 respectively in the unsprayed and sprayed areas while *A. culicifacies,* the vector in the plains of the Punjab, had densities below 1·0 per man-hour in both areas.

None of the 510 mosquitoes dissected showed gut or salivary gland infections and blood smears from children under 6 months of age, in sprayed and unsprayed areas, were negative.

Adults of *A. fluviatilis,* the density of which was higher than the critical level for malaria transmission, preferred cattle sheds to human dwellings for daytime resting. *M. G. R. Varma*

AZZEZ, S. A. & BAIG, W. R. **Variations in the Palpal Banding in** *A. philippinensis* **Ludlow, 1902.** *Bull. Nat. Soc. India for Malaria & other Mosquito-Borne Dis.* 1959, Nov., v. 7, No. 6, 169–71, 2 figs.

BROUWER, R. **The Attraction of Carbon Dioxide excreted by the Skin of the Arm for Malaria Mosquitoes.** *Trop. & Geograph. Med.* Amsterdam. 1960, Mar., v. 12, No. 1, 62–6, 1 graph. [12 refs.]

Carbon dioxide has several times been reported as stimulating and attracting mosquitoes searching for a blood meal. Using apparatus designed for experiments on human physiology, the author shows that human skin steadily excretes carbon dioxide. However, the amounts are small, ranging from about 20 to 120 ml. CO_2 per square metre per hour. Thus, if ordinary fresh air flows over a human forearm at the rate of 2 litres per minute, the excreted CO_2 would add only 0·003% to the normal content of the air. Furthermore, the maximum difference in CO_2 in the air from the arms of two experimental subjects was only 0·025%.

These data suggest that differences in CO_2 output are unlikely to be an important cause of differences in attractiveness to mosquitoes of various people. This was confirmed in tests with two pairs of subjects, one of each pair being decidedly more attractive to mosquitoes (*Anopheles stephensi*). It was found that air from the favoured persons was still much more attractive to the insects when all CO_2 was removed from it. *J. R. Busvine*

CORRADETTI, A. **Relapses and Immunological Course in** *Plasmodium* **Infections.** *Parassitologia.* Rome. 1959, Oct., v. 1, No. 2, 91–6. [17 refs.]

A comparison of the immunological relations in malaria parasites shows that there is considerable variation in the patterns observed, depending upon the course of infection in different species. The problem of relapses is still controversial, though these are commonly thought to be due to the persistence of the exo-erythrocytic cycle of development. An account is given of the

pattern of infection in avian (*Plasmodium rouxi, P. elongatum, P. gallinaceum*) and mammalian (*P. berghei, P. cynomolgi, P. vivax, P. ovale* and *P. falciparum*) parasites, and it is concluded that, although in some species of *Plasmodium* relapses can be produced experimentally by splenectomy, they occur spontaneously only in those mammalian parasites in which the pre-erythrocytic development takes place in the liver. Moreover, though the persistence of exo-erythrocytic stages in the liver may be responsible for relapses, they are produced mainly by parasites surviving in the erythrocytes of the blood stream, as shown by the fact that in blood-induced infections relapses commonly occur in the absence of EE forms in the liver. *C. A. Hoare*

WALTERS, J. H. & MCGREGOR, I. A. **The Mechanism of Malarial Hepatomegaly and its Relationship to Hepatic Fibrosis.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1960, Mar., v. 54, No. 2, 135–45, 6 figs. (5 on 2 pls.). [18 refs.]

Biopsy specimens were obtained from the livers of 9 Gambian children aged 3 to 3½ years who had been given regular antimalarial suppressive therapy from birth (Group A), and from the livers of 11 children of a similar age who had been treated only in order to control malaria (Group B), and who all had hepatomegaly [this *Bulletin,* 1957, v. 54, 389].

Changes in hepatic cells were not marked. Cellular infiltration of the periportal areas and sinusoids were found in 5 of Group A and in all of Group B. In the latter group there were increases in both size and numbers of Kupffer cells, which were loaded with pigment, and, in addition, the sinusoids were increased in calibre compared with those in Group A (measured by comparing the ratio of sinusoidal area to hepatic area). Specimens stained by Gomori's silver impregnation method showed some increase in portal fibrous tissue in 6 Group A and 9 Group B specimens, with "abnormal outgrowths" from the margins of the portal tracts in all the latter and only one of the former (stated to be a congenital syphilitic).

The authors confirm the observations of other workers to the effect that the sinusoids are dilated in chronic malarial hepatomegaly. In their view this is the most significant factor in its production. *B. G. Maegraith*

See also p. 1152, BLANC *et al.*, L'association morbide paludisme-leishmaniose viscérale. **[Co-existence of Malaria and Kala Azar.]**

KALSBEEK, F. Beiderzijdse abducensparese als oorzaak van de diplopie bij het gebruik van chloroquine. [**Diplopia caused by Ambilateral Paresis of the Abducens after ingestion of Chloroquine**] *Nederl. Tijdschr. v. Geneesk.* 1960, July 23, v. 104, No. 30, 1414–16.

The English summary appended to the paper is as follows:—

"Several cases of ambilateral paresis of the abducens after administration of chloroquine are presented. These are the first cases that have been reported to date."

[See this *Bulletin,* 1958, v. 55, 1075; 1959, v. 56, 513; 1960, v. 57, 215.]

CAMPBELL, C. H. **Pigmentation of the Nail-Beds, Palate and Skin occurring during Malarial Suppressive Therapy with "Camoquin".** *Med. J. Australia.* 1960, June 18, v. 1, No. 25, 956–9, 4 figs. (3 coloured on pl.).

Among others 100 European adults and 291 European children at Port Moresby, New Guinea, who were taking camoquin regularly as a malaria suppressive were examined for the pigmentary changes known to occur with this drug. These changes in adults usually appear first on the nail beds of the toes, on the mucosa of the hard palate, on the nail beds of the fingers or, lastly, on the skin of the face and neck; their extent and distribution are variable, but face involvement does not usually develop for at least 2 years. The colours range from grey or bluish-grey to black, and are first manifest as irregular streaks or patches. The amount and extent of the pigmentation are not directly related to the dosage of camoquin. Its presence has a connexion with the duration of drug-taking, and it makes its appearance in adults not less than 9 months after starting the drug; it is evident in most adult patients who have regularly taken camoquin for at least 2 years. On stopping the drug the pigmentation as a rule vanishes from the face within 6 months, and from the nail beds by the 9th month; on occasions it persists for much longer. In children pigmentation is less common; it is confined to the palate and does not appear on the face or the nails. No pigmentation was found attending the use of the other commonly-used malaria suppressants with the exception of quinacrine [mepacrine], which produces a very similar discoloration.

Biopsy was done on two pigmented adults, from one a specimen being collected from the face and from the other the palate. The pigment was identified as melanin in each case. On seeing such patients with pigmentation, before considering a diagnosis of conditions such as haemochromatosis or Addison's disease it is well to explore the possibility of their having been on camoquin for a couple of years. *A. R. D. Adams*

WEEKLY EPIDEMIOL. REC. WHO. 1960, v. 35, No. 28, 322–6. [In parallel French & English.] **Malaria. Insecticide Resistance in Vectors.**

This paper contains a summary of information reported to the World Health Organization, up to 15th April 1960, of insecticide resistance in *Anopheles* to DDT and dieldrin. Resistance to gamma BHC is not listed as it is believed that this is nearly always linked with resistance to dieldrin. 31 species and varieties of *Anopheles* are listed which are resistant to one or both insecticides, or are intermediate between resistant and susceptible populations. A resistant population is defined as one in which at least half the sample of mosquitoes survives one hour's contact with 4% DDT or 1·6% dieldrin in the WHO standard susceptibility kit.

No population of *Anopheles* is believed to be naturally tolerant of hydrocarbon insecticides and the development of resistance has followed the application of residual insecticides. In some countries resistance in *Anopheles* has appeared before residual spraying in houses (*A. albimanus* in El Salvador and *A. pharoensis* in Egypt) and this is attributed to the use of insecticides against agricultural pests. *B. R. Laurence*

ARDELEAN, I. & CRISTESCU, Aurelia. Cercetări asupra rezistentei anofelilor la insecticidele remanente. [**Investigations on the Resistance of *Anopheles* to Residual Insecticides**] *Igiena*. Bucharest. 1960, Jan.–Feb., v. 9, No. 1, 41–52, 4 figs. [13 refs.] English summary.

A laboratory colony of *Anopheles maculipennis* var. *atroparvus* [*A. labranchiae atroparvus*] has been carried through 54 generations with exposure to sublethal concentrations of DDT. The adult insects were placed on a surface coated with DDT in a concentration increasing in successive generations from 0·01 to 2 gm. per 1,000 sq. cm. for a period ranging from 5 to 35 minutes. The period between emergence from the pupa to oviposition was prolonged to 6–24 days, with a mean value of 7·9 days in untreated controls. There was also a slight reduction in the duration of the larval stage. Resistance to DDT was rapidly lost in subgenerations established from treated insects between the 22nd and 51st generations. *D. J. Bauer*

RAMAKRISHNA, V. & ELLIOTT, R. **The Vectorial Capacity of an Insecticide-Resistant Strain of *A. gambiae*.** *West African Med. J.* 1960, June, v. 9 (n.s.), No. 3, 105–10, 1 fig.

According to BUSVINE [this *Bulletin*, 1957, v. 54, 767], the vectorial capacity of insecticide-resistant strains of *Anopheles* as compared with susceptible strains was, in general, not known.

Observations were attempted on the average *Anopheles* density, sporozoite rate and average infective density of populations of *A. gambiae* resistant to dieldrin and BHC in Western Sokoto. The lower dosage of dieldrin (25 mgm. per sq. ft.) initially reduced the average infective density, which rapidly recovered and remained unchanged even when a double dose of dieldrin was used. BHC mainly reduced the *Anopheles* population and hence the average infective density. Accordingly, the authors concluded that reduction of malaria transmission by the successive use of dieldrin and BHC may be due to reduction in population numbers under different insecticidal pressures, but the vectorial capacity of the species is probably unchanged by the alteration from the heterozygous to the homozygous character.

The introduction of DDT reduced the remaining population to such a low level that malaria transmission, measured by the average infective density, could not be detected although it was known to be taking place.

A. M. Guneidy

MALDONADO-CAPRILES, J. & NASIR, A. S. **DDT-Resistant Adults of *Anopheles subpictus* in the Lahore District of West Pakistan.** *Mosquito News*. 1960, Mar., v. 20, No. 1, 52–4.

DDT resistance in *Anopheles subpictus* has already been found in various parts of India [SHARMA and KRISHNAMURTHY, *Bull. Nat. Soc. India for Malaria and other Mosquito-Borne Dis.*, 1957, v. 5, 78; this *Bulletin*, 1957, v.

54, (1054)] and it now appears that resistance has also developed in West Pakistan.

Using standard WHO techniques the authors tested wild-caught adult *A. subpictus* (from villages near Lahore) for resistance. Low kill was obtained when the mosquitoes from one village were exposed to 4% DDT for one hour and only 49·3% mortality resulted from 2 hours' exposure. 53·8% mortality was recorded for mosquitoes from a second village exposed for 4 hours to 4% DDT. These results were taken as evidence of resistance.

[The LC50 of presumably susceptible *A. subpictus* was shown by Sharma and Krishnamurthy (*loc. cit.*) to be 0·37%. This suggests that the level of resistance of the mosquitoes from the Lahore region is *at least* 10 times the normal.] *B. C. Fine*

BANO, L. **A Cytological Study of the Early Oocysts of Seven Species of *Plasmodium* and the Occurrence of Post-Zygotic Meiosis.** *Parasitology.* 1959, Nov., v. 49, Nos. 3/4, 559–85, 137 figs. [36 refs.]

Up to the present there was no direct evidence concerning the stage of development at which meiotic division occurs in the genus *Plasmodium*, some believing that it was pre-gametic, others that it was post-zygotic. In order to solve this problem the author made a cytological study of the early oöcysts in 7 species of malaria parasites, comprising avian (*P. gallinaceum*), murine (*P. berghei*), simian (*P. cynomolgi, P. gonderi, P. inui, P. knowlesi*) and human (*P. vivax*) species. The parasites in infected mosquitoes were examined in smears of the intestinal contents, in flattened preparations and sections of midguts, fixed and stained by various methods.

It was found that the zygotes and oökinetes of all the species of parasites were uninucleate, indicating that the first nuclear division does not take place in these stages. However, post-zygotic meiosis was demonstrated in young oöcysts varying in age in different species from 47 to 79 hours. The successive stages of nuclear division of each species are described in detail and illustrated in a series of figures. It was shown that the spireme in the different parasites had a characteristic appearance in prophase. In the early stages of this phase the chromosomes are diploid, while during the first reduction division they became haploid. The succeeding nuclear divisions give rise to multinucleate oöcysts, with distinct groups of haploid chromosomes in each species, which have a characteristic number of chromosomes, *viz.* 2 in *P. gallinaceum*, 4 in *P. cynomolgi*, 3 in *P. gonderi*, 4 in *P. inui*, 2 in *P. knowlesi*, *P. berghei* and *P. vivax*. [See also this *Bulletin*, 1955, v. 52, 1045 ; 1957, v. 54, 1057.]

C. A. Hoare

COWPER, S. G. **An Amending Note on the Transmission of *Plasmodium berghei* from Immunized Rats to Subinoculated Mice.** [*Miscellanea.*] *Ann. Trop. Med. & Parasit.* 1959, Dec., v. 53, No. 4, 507–8.

In a previous paper [this *Bulletin*, 1960, v. 57, 222] it was stated that pigment was found in the spleen of mice inoculated from rats immune to *Plasmodium berghei*, while in some mice parasites appeared in the blood.

Moreover, some of the donor rats had been treated with Daraprim [pyrimethamine]. From these observations it was deduced that (1) the donor rats had a latent infection and were in a state of premunition, and (2) the drug failed to clear the infection.

The author has since demonstrated that malarial pigment also appeared in the spleen material obtained post mortem from cases of malignant tertian malaria. These experiments provided evidence that pigment can be transferred mechanically to mice and taken up by phagocytes in their spleen. Though the presence of pigment in recipient mice provided no evidence of a latent infection in donor rats, the bone-marrow response (including reticulocytosis) and the reappearance of parasites in the mice are suggestive of premunition in the rats. *C. A. Hoare*

ZUCKERMAN, Avivah. **Auto-Antibody in Rats with** *Plasmodium berghei*. [Correspondence.] *Nature*. 1960, Jan. 16, v. 185, 189–90.

It has been observed that in anaemia resulting from malaria infection in man, other mammals, and birds, the loss of blood is much greater than can be accounted for by the destruction of the erythrocytes during multiplication of the parasites. That the destruction of red cells is due to other factors is also evident from the fact that it also occurs during latent periods of the infection, when parasitaemia is at a low level. To explain this phenomenon, the author advanced a hypothesis, according to which the malaria parasites cause the erythrocytes to become antigenic, with the result that the latter stimulate the production of auto-antibody.

To test this hypothesis, in adult rats infected with *Plasmodium berghei*, with low parasitaemia and high blood loss, a modified Coombs test, in which anti-rat-serum rabbit serum represented antiserum, was employed for the detection of auto-antibody. The tests revealed antibody coating of the red cells after crisis, when there was excessive loss of blood but low parasitaemia, showing that the majority of these cells must have been uninfected. On the other hand the test was negative in the same rats before crisis.

From these experiments it is concluded that, in rats infected with *P. berghei*, auto-antibody is formed against their own uninfected red cells, the removal of antibody-coated cells from the circulation being responsible for excessive anaemia. It is suggested that a similar process might take place in other plasmodial infections. *C. A. Hoare*

RILEY, M. V. & DEEGAN, T. **The Effect of** *Plasmodium berghei* **Malaria on Mouse-Liver Mitochondria.** *Biochem. J.* 1960, July, v. 76, No. 1, 41–6, 2 figs. [24 refs.]

The action of a number of drugs, hormones and steroids has been shown to be connected with the effect which they exercise on mitochondria of tissue cells. It seemed possible that in malaria analogous processes might be at work. The present investigation aimed to determine if changes were detectable in mitochondria of liver from mice infected with *Plasmodium berghei*.

The viscera of the infected animals and of mice rendered anaemic by bleeding, to simulate conditions in malaria, as well as of control animals, were perfused *in vivo* with ice-cold 0·9% NaCl before removal of 2 to 4 livers for preparation of mitochondria by two different techniques. Oxygen uptake and associated phosphorylation for determination of P/O ratio were measured in the presence of different substrates. It was not until infection had progressed for 14 days that any difference was detected in the P/O ratio of normal and infected animals. In the infected animals mitochondria showed lower oxidative capacity and lowered P/O ratio.

The effect of DPN (diphosphopyridine nucleotide) on a number of these systems was studied. Normal mitochondria broke down ATP (adenosine triphosphate) more slowly than those from infected animals, and each preparation differed in orthophosphate content. In animals rendered anaemic the P/O ratios were normal.

The malarial infection in mice thus produces changes in liver mitochondria, and oxidation rates of certain substrates are lowered as well as the P/O ratio. Adenosine triphosphate activities are in some cases increased. The bearing of these findings on the associated anaemia and their relation to similar findings during toxic damage to liver are discussed. *J. D. Fulton*

FABIANI, G. & ORFILA, Jeanne. Infection expérimentale de la souris blanche par *Plasmodium vinckei*. [**Experimental Infection of Mice with** *Plasmodium vinckei*] *Bull. Soc. Path. Exot.* 1959, Sept.–Oct., v. 52, No. 5, 618–30, 2 figs.

An account is given of the pattern of infection in mice infected with *Plasmodium vinckei*, based on a study of 100 adult mice inoculated intraperitoneally with 1 million parasitized red cells each. After a prepatent period between 1 and 4 days, all the mice developed parasitaemia. In 91 animals the infection terminated fatally after 5–12 (usually 6–7) days, while in the 9 that survived the duration of the infection was 15–17 days. In acute cases, there is rapid development of anaemia, with a reduction of the red cells from about 10 million per cmm. to 2–3 million by the 5th day of patency, and to 2–1·5 million on the day of death. As the erythrocytes are destroyed the proportion of reticulocytes rises, reaching 20–30% of all the red cells. This change in the blood picture is accompanied by progressive invasion of immature cells by the parasites. In those mice that recovered from the acute phase of infection parasitaemia decreases until less than 8% of the red cells remain infected. In such cases the infection becomes latent, with scanty parasites in the blood. Their persistence is evident from the fact that splenectomy brings about a relapse with fatal termination.

It was also shown that there is no cross-immunity between *P. vinckei* and *P. berghei* [see also this *Bulletin*, 1955, v. 52, 340]. *C. A. Hoare*

TRYPANOSOMIASIS

*In this section abstracts are arranged as far as possible in the following order:—*African—*human, animal;* American—*Chagas's disease and other trypanosome infections. In each form the following order is followed:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.*

CORRIGENDUM

In the paper by NASH on "A Review of the African Trypanosomiasis Problem", this *Bulletin*, 1960, v. 57, pp. 973–1003, the last line of para. 3, p. 979, should read:

" be exceptionally high (BUXTON, 1955)."

VON BRAND, T. & TOBIE, Eleanor J. **The Mechanism of Elimination of Certain Strains or Species of Trypanosomes when Mixed in Experimental Infections.** *J. Parasitology*. 1960, Apr., v. 46, No. 2, 129–36, 5 figs. [15 refs.]

In these experiments strains of trypanosomes with different characteristics were mixed in infections. Mixtures consisted of an akinetoplastic strain with a normal strain, and an arsenic-resistant strain with an arsenic-sensitive strain. In either instance the abnormal strain had a slightly lower rate of reproduction. The differences between the rates of reproduction were not statistically significant but were believed by the authors, nevertheless, to be real.

Rates of disappearance of the slower growing component were studied in relation to the predicted rate of their disappearance. In rats and mice the disappearance of the akinetoplastic strain showed good agreement between experimental determination and calculation according to theory. In chronic infections in rabbits results however were irregular. This was due probably to the low infections in the blood of the rabbit, which on passage into mice produced infections based on too small a number of organisms to give a true picture of the balance of the two strains. The arsenic-resistant strain disappeared more slowly from mixtures than theoretical calculation predicted.

In none of these well controlled and analysed experiments was there any evidence of hybridization of the strains, but in at least one series of experiments there was convincing evidence that small differences in the rate of reproduction of the strains were the most important factors in the elimination of one strain from the mixture of two acute strains in laboratory rodents.

W. E. Ormerod

FULTON, J. D. **Experiments on Transformation of Trypanosomes by Deoxyribonucleic Acid.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1960, July, v. 54, No. 4, 296. Discussion 296 [GORDON, R. M.]

In this short paper the author discussed briefly the historical aspects of studies on transformation of species. He then referred to experiments

designed to transfer drug resistance to a parent strain of *Trypanosoma rhodesiense* with undegraded deoxyribonucleic acid from a strain of the same parasite made resistant to arsenicals. The results were encouraging and study continues. Negative results were obtained with strains resistant to suramin and stilbamidine.

Infectivity for the mammalian host was lost by culture forms of *T. rhodesiense*. Attempts were made to restore infectivity by incubating such forms with deoxyribonucleic acid obtained from the blood stream form and a drug-resistant variant of it. The attempts were unsuccessful.

In discussion, Gordon referred to the author's observations on the effect of trehalose added to cultures of trypanosomes maintained on Weinman's medium. In Liverpool this medium had been used with success during the previous year for maintaining cultures of *T. gambiense, T. rhodesiense* and *T. congolense*. So far, it had not been possible to confirm Weinman's observations that added trehalose rendered such cultures infective to the mammalian host. In fact, a subculture of *T. gambiense* isolated 17 days previously and grown on Weinman's medium infected a laboratory mouse, in the absence of added trehalose. *H. J. O'D. Burke-Gaffney*

BURSELL, E. **The Effect of Humidity and Temperature on the Extent of Abdominal Pigmentation in** *Glossina pallidipes* **Austen.** *Bull. Entom. Res.* 1960, Apr., v. 51, Pt. 1, 39–46, 4 figs. & 1 pl.

The extent of pigmentation of the abdominal bands of *Glossina pallidipes* was found to depend on the humidity of the pupal environment. Full pigmentation was produced in saturated air and almost complete suppression of pigmentation in dry air. The occurrence of dark and pale forms of this species in the field is discussed with reference to seasonal changes in Tanganyika and it is suggested that the darker individuals emerge from puparia deposited in evergreen thickets along the drainage lines, and that the paler forms come from pupae deposited in semi-deciduous thickets on alluvial slopes. The effect of humidity on coloration of *G. swynnertoni, G. morsitans, G. palpalis fuscipes* and *G. longipennis* was also tested but only a slight alteration was observed in the coloration of the second abdominal segment of *G. swynnertoni*. *B. R. Laurence*

TAYLOR, Angela E. R. **The Absorption of Prothidium by** *Trypanosoma rhodesiense*. *Brit. J. Pharmacol. & Chemotherapy*. 1960, June, v. 15, No. 2, 230–34, 5 figs.

Prothidium (7-amino-2-(2-amino-6-methylpyrimidin-4-yl)amino-9-*p*-aminophenylphenanthridine 10, 1′-dimethobromide) is a prophylactic drug against *Trypanosoma congolense* and *T. vivax* in cattle. Solutions show orange fluorescence with a peak absorption at 315 mμ, detectable at 1 μgm./ml. This property was used to study absorption. Trypanosomes (*T. rhodesiense*) from rats treated with prothidium show fluorescence especially in the blepharoplast

and granules in the cytoplasm. When trypanosomes were separated from the blood of rats treated 5 hours previously, 0·01–0·06 μgm. of prothidium could be extracted per million trypanosomes. When trypanosomes were exposed to the drug *in vitro*, the concentration inside the trypanosome was 140–590 (av. 400) times as great as that outside. (With drugs like trivalent tryparsamide or acriflavine the ratio is 5,000 to 8,000 [this *Bulletin*, 1939, v. 36, 220].)

F. Hawking

TAYLOR, Angela E. R. **The Absorption, Distribution and Excretion of Prothidium in Rats, Rabbits and Cattle.** *Brit. J. Pharmacol. & Chemotherapy.* 1960, June, v. 15, No. 2, 235–42, 7 figs. [14 refs.]

When prothidium was injected intraperitoneally into rats or rabbits it was concentrated particularly in the liver and kidneys and it was detectable in these organs for 7–10 days. Biologically (by its protection of rats against *Trypanosoma vivax*) it could be detected for 8 weeks. The main excretion of prothidium appeared to occur by the bile where it could be detected (in rats) for 9 days. But no prothidium could be detected in the faeces or urine, so prothidium must be absorbed lower down in the gut, or broken down by bacteria in the intestines. After subcutaneous injection in cattle, a deposit is formed locally which remains for over 3 months; the prolonged prophylactic action is probably due to this deposit.

F. Hawking

INGRAM, D. G. & SOLTYS, M. A. **Immunity in Trypanosomiasis. IV. Immuno-Conglutinin in Animals Infected with** *Trypanosoma brucei*. *Parasitology.* 1960, May, v. 50, Nos. 1/2, 231–9.

The conglutinin phenomenon of COOMBS and COOMBS [*Bull. Hyg.*, 1954, v. 29, 538] was found to occur in the serum of animals infected with trypanosomes. The reaction consisted in the agglutination of sheep blood cells which had been activated with horse immune products, by sera which had been treated previously with normal sheep cells. Rabbits, rats, mice and cats produced immuno-conglutinin in titres up to 1 in 1,000, depending upon the number of trypanosomes injected. The more virulent the infection the higher the titre. After successful treatment with suramin the titres fell to the level of uninfected animals. In animals infected with drug-resistant strains, treatment with suramin did not reduce the level of titre. This was in marked contrast to the neutralizing antibody [SOLTYS, this *Bulletin*, 1958, v. 55, 739] which remained at a high level after treatment.

Another difference between immuno-conglutinin and neutralizing antibody lay in the more rapid increase in titre of the former after infection. Immuno-conglutinin titres rose to their maximum in 7 to 10 days after infection, whereas neutralizing antibody did not reach its maximum until 20 to 30 days after infection.

[See also this *Bulletin*, 1960, v. 57, 15.]

W. E. Ormerod

TRAGER, W. **Tsetse-Fly Tissue Culture and the Development of Trypanosomes to the Infective Stage.** *Ann. Trop. Med. & Parasit.* 1959, Dec., v. 53, No. 4, 473–91, 34 figs. (33 on 10 pls.). [42 refs.]

In a preliminary communication [this *Bulletin*, 1960, v. 57, 348] the author gave a short description of a new method devised by him for growing pathogenic trypanosomes in tsetse-fly-tissue culture. In the present paper a detailed account is given of the technique used and of the results obtained. In addition to the medium described previously [*loc. cit.*], which produced the best results, various modifications of it were also used.

This medium served for the growth *in vitro* of diverse tissues and organs removed from tsetse pupae and adult flies, the cultivation of which is described in detail and illustrated by photomicrographs. In cultures of the gut and salivary glands *Trypanosoma vivax*, obtained from a sheep with a chronic infection, grew readily at 30–32°C., but attempts to cultivate this trypanosome from recently infected sheep failed. At these temperatures the blood forms were transformed into crithidial forms of the type found in the vector, whereas metacyclic trypanosomes were produced in cultures kept at 38°C. for 19 hours. Only such cultures gave rise to infections in clean sheep. On the other hand, although *T. brucei* and *T. congolense* were also successfully grown in the above media and produced stages similar to those in the vector, attempts to infect mammalian hosts with their cultures were unsuccessful. *C. A. Hoare*

STEPHEN, L. E. & GRAY, A. R. **The Trypanocidal Activity of Nucleocidin against *Trypanosoma vivax* in West African Zebu Cattle.** *J. Parasitology.* 1960, Aug., v. 46, No. 4, 509–14. [14 refs.]

"The antibiotic, nucleocidin, appears to possess considerable activity against *T. vivax* infections in West African White Fulani zebu cattle. A single intramuscular injection at a dose rate of 0·025 mg per kg cleared the peripheral blood of trypanosomes within 20 hours.

"The infection was not cured, however, and relapses occurred 18, 24, and 33 days after treatment in the 3 animals used in the experiment."

JUMINER, B. & GOUDINEAU, J. A. Sensibilité de la gerbille (*G. hirtipes*) à *Trypanosoma lewisi*. [**Susceptibility of the Gerbil *G. hirtipes* to *T. lewisi***] *Arch. Inst. Pasteur de Tunis.* 1960, June, v. 37, No. 2, 171–80.

ANDRADE, A. Z. Anatomia patológica da doença de Chagas. [**Pathological Anatomy of Chagas's Disease**] *Rev. Goiana Med.* 1958, Apr.–June, v. 4, No. 2, 103–19, 5 figs. [22 refs.] English summary.

TORRES, C. M. Patogenia das lesões do miocárdio na doença de Chagas. [**Pathogenesis of Myocardial Lesions in Chagas's Disease**] *Rev. Goiana Med.* 1958, Apr.–June, v. 4, No. 2, 121–34, 3 figs. [12 refs.] English summary.

RASSI, A., BORGES, C., DE REZENDE, J. M., CARNEIRO, O., SALUM, J., RIBEIRO, I. B. & DE PAULA, O. H. Fase aguda da doença de Chagas. Aspectos clínicos observados em 18 casos. [**Acute Form of Chagas's Disease. Clinical Features of 18 Studied Cases**] *Rev. Goiana Med.* 1958, Apr.–June, v. 4, No. 2, 161–89, 12 figs. [20 refs.] English summary.

LEISHMANIASIS

In this section abstracts are arranged as far as possible in the following order:—visceral, cutaneous, muco-cutaneous.

BONEBAKKAR, A. **Kala-Azar in a Dutch Sailor.** *Trop. & Geograph. Med.* Amsterdam. 1960, Mar., v. 12, No. 1, 1–6, 2 figs.

This paper describes an unusual case of visceral leishmaniasis with an incubation period of 1½ years occurring in a young Dutch seaman infected in India. His ship had cruised along the coast from June to November 1946 and on several occasions he had been ashore in Rangoon, Calcutta and Madras. In June 1948 he had collapsed at work and had become increasingly weak. On admission to hospital 7 months later he had lost 17 kgm. in weight and was weak and anaemic. A slight brown pigmentation of the face was visible, as in chloasma. The spleen was enlarged below the umbilicus and the liver two fingerbreadths below the costal margin. The haemoglobin was 53%, erythrocytes 2·9 million, leucocytes 1,500 per cmm. The leucocyte-erythrocyte ratio was at 1/2,900 (compared with an average of 1/700 in normal subjects). These findings, together with progressive loss of weight, fever with double peaks and various laboratory findings suggested kala azar.

Biochemical findings supported this diagnosis, such as reduction of serum albumins to 23 per mille. Serum globulins were increased to 43 [gm.] per mille, and serum proteins totalled 66 per mille. The Takata-Ara and formol-gel tests were strongly positive. The final proof was the demonstration of Leishman-Donovan bodies in the sternal marrow. A culture of the packed white cells on NNN medium showed an abundant growth of leishmaniae.

The patient was treated with a pentavalent antimony compound, glucantime (sodium antimony gluconate), which was administered by subcutaneous and intravenous route, as a 30% solution containing nearly 10% of antimony, and it proved very successful. Commencing with a dose of 3 ml. intravenously on January 12th, it was raised to 10 ml. 3 days later: 5 ml. were given on January 15th. The temperature returned to normal after 4 days and has remained so. Treatment was continued with subcutaneous injections of 20 ml. on alternate days for another fortnight. The total amount of glucantime was 178 ml.

Philip Manson-Bahr

BLANC, F., MERLIHOT, J. & AUBERT, L. L'association morbide paludisme-leishmaniose viscérale. [**Co-existence of Malaria and Kala Azar**] *Bull. Soc. Path. Exot.* 1959, Sept.–Oct., v. 52, No. 5, 630–55. [Numerous refs.]

The recorded co-incidence of kala azar and malaria is almost certainly much less than the true situation, especially in view of the vast territories in which the two diseases overlap epidemiologically. The explanations of the low figures might be (1) the actual rarity of the double infection—there is no real information on this point, (2) the existence of some antagonism between the two infections; this is not verified by experiment or experience, or (3) errors in diagnosis.

In view of the similarity of many of the clinical signs of the two diseases the third explanation is probably the correct one. The physician should consider the one disease whenever the treatment for the other is unsuccessful. Fortuitous discovery of the combined infection is more likely when kala azar is suspected, since both marrow (or spleen) and blood will then be examined, whereas if malaria is suspected, only the blood is likely to be examined.

The epidemiologist should consider the possibility of combined infection where the spleen rate remains high in adults in areas in which solid malaria immunity is unlikely. Other causes of enlarged spleen, such as schistosomiasis, must of course be excluded.

In the geographical regions where the diseases may co-exist, simultaneous examination of blood and bone marrow should be carried out. This applies for instance to Cambodia and Laos, where an endemicity of leishmaniasis of unexpected proportions may be uncovered.

The paper contains an excellent review and analysis of the relevant literature, including 6 detailed case histories. *B. G. Maegraith*

DEGTYAREVA, S. M. & ZASUKHIN, D. N. [**Growth of the Causative Agent of the Desert Type Skin Leishmaniasis in Tissue Cultures**] *Med. Parasit. & Parasitic Dis.* Moscow. 1959, v. 28, No. 6. 706–10, 7 coloured figs. on pl. [In Russian.] English summary (9 lines).

The object of the investigation described in this paper was to cultivate leishmaniae in the stage in which they occur in the mammalian host. For this purpose *Leishmania tropica major* was grown in 3 tissue cultures: (a) muscles of chick embryos, (b) HeLa cells and (c) SOTS, a strain of cells isolated from monkey heart. All the cells were grown on coverslips in flasks with nutritive media, which in the case of (a) consisted of 40% Hanks solution, 40% cow's amniotic fluid and 20% bovine serum; in the case of (b) of 40% inactivated human serum and 60% Hanks solution; and in the case of (c) of 85% medium No. 199 (MORGAN *et al.*, *Proc. Soc. Exper. Biol. & Med.*, 1950, v. 73, 1) and 15% bovine serum. After different periods these cultures were inoculated with leptomonad forms of *L. tropica* from NNN cultures, and grown at 37°C. In all cases the flagellates invaded the host cells, where they were transformed into leishmanial forms multiplying by binary fission. After about 3 days the host cells were gradually destroyed and the enclosed leishmaniae underwent degeneration.

The appearance of the parasites developing in tissue cultures is depicted in an excellent colour plate. *C. A. Hoare*

DEMINA, N. A. & KELLINA, O. J. **[Leishmaniasis in Guineapigs]** *Med. Parasit. & Parasitic Dis.* Moscow. 1959, v. 28, No. 6, 699–706, 8 figs. on 2 pls. [In Russian.] English summary.

Guineapigs were inoculated intradermally, subcutaneously and intraperitoneally with cultures of *Leishmania enriettii* and intradermally with Leishman-Donovan forms from sores. Infection was produced only when the parasites were introduced intradermally. From 1 to 3 weeks after inoculation, there appeared at the site of inoculation infiltrations which later developed into ulcers: lesions of both types contained numerous parasites. In a few cases secondary manifestations, such as infiltration of the testes and ulceration of the nose, were noted. The primary lesions persisted up to 8 months, while the secondary ones lasted up to 9 months. As the result of infection, all the animals acquired an immunity to superinfection. *C. A. Hoare*

FEVERS OF THE TYPHUS GROUP

In this section abstracts are arranged as far as possible in the following order:—general; louse-borne typhus, flea-borne typhus, mite-borne typhus; rickettsialpox; tick-borne typhus; Q fever, other rickettsial diseases.

MELNOTTE, P. & FOLIGUET, J. M. Actualité des rickettsioses. **[Current Aspects of Rickettsioses]** *Rev. d'Hyg. et de Méd. Sociale.* Paris. 1960, Apr.–May, v. 8, No. 3, 298–305.

This short review of the main features of the rickettsioses stresses their ability to cause syndromes which reflect the involvement of different parts of the reticulo-endothelial system. Meningoencephalitis, cutaneous eruptions, cardiovascular disorders (including endocarditis), ocular lesions such as iridocyclitis, pulmonary manifestations, hepatorenal disturbances, and abortion may occur separately or in association. Rickettsiosis should therefore be suspected when dealing with any infectious syndrome, and appropriate serological tests performed.

Microagglutination tests carried out at Nancy on 1,204 human sera gave the following numbers of positive reactions with the rickettsial antigens indicated: epidemic type, 9 (0·74%); murine type, 12 (0·99%), of which 4 were attributed to cross-reaction with antibody for the epidemic type; boutonneuse fever, 6 (0·49%); Q fever, 58 (4·8%); the neorickettsial strain Q18, 1 (0·08%). Tests on 82 sera from cattle and sheep gave 4 (4·8%) positive reactions with Q fever antigens and 33 (40·2%) with Q18 antigens. *R. S. F. Hennessey*

FOLIGUET, J. M. Agglutinines naturelles et agglutinines postvaccinales antirickettsies chez l'homme. **[Natural and Post-Vaccinal Rickettsial Agglutinins in Man]** *Rev. d'Immunologie.* 1960, Apr.–June, v. 24, No. 3, 367–87, 4 graphs.

Tests on sera from 100 young French soldiers who had never received an antirickettsial vaccine and had no history suggestive of previous rickettsial infection showed that agglutinins for *Rickettsia prowazeki* were present in 42 (titres from 1 in 20 to 1 in 80) and for *R. mooseri* in 22 (titres from 1 in 20 to 1 in 40). The presence of agglutinins did not appear to be related to previous residence in any particular locality or to previous employment. After a course of 3 injections of antirickettsial vaccine (Durand-Giroud), the sera of all subjects contained agglutinins for both epidemic and murine types at titres ranging from 1 in 40 to 1 in 1,280. The response to vaccination was significantly greater in those subjects whose sera contained agglutinins at the time of vaccination. Titres of 1 in 320 were found in the sera of some subjects tested 6–12 months after vaccination. A marked fall in titre generally occurred after 1 year, antibodies for the murine type disappearing more rapidly than those for the epidemic type. The possibility of previous antirickettsial vaccination should therefore be considered when interpreting the results of agglutination tests with rickettsial antigens, especially in view of the number of young subjects who are vaccinated during military service.

R. S. F. Hennessey

EYCKMANS, L. & TRIEST, A. Rickettsioses et pneumonies atypiques au Bas-Congo. **[Rickettsial Infections and Atypical Pneumonia in Lower Congo]** *Ann. Soc. Belge de Méd. Trop.* 1960, Feb. 29, v. 40, No. 1, 105–14. [13 refs.]

Microagglutination tests with rickettsial antigens, on sera from 10 out of 26 patients with atypical pneumonia admitted to hospital at Kisantu during a period of 18 months in 1958–59, gave results suggesting that the pulmonary conditions were associated with infection by *Rickettsia prowazeki* in 5 cases, by *R. mooseri* in 2, and by *R. burneti* in 3. As it seemed likely that these 26 cases represented only a fraction of those occurring in the neighbourhood of the hospital, intradermal tests with antigens of *R. prowazeki* (from infected mouse lung) and *R. burneti* (from egg culture) were performed on 65 adult males whose occupations did not appear to carry any special risk of rickettsial infection. Marked reactions occurred in between 5% and 10% of subjects, which is taken as evidence of contact with the pathogenic rickettsiae concerned. It is concluded that infections with *R. prowazeki* and *R. burneti*, and to a lesser extent with *R. mooseri*, are prevalent in the lower Congo region, the pulmonary forms of these infections being remarkably benign.

R. S. F. Hennessey

DZETSINA, L. V. **Clinical and Epidemiological Findings on Sporadic Cases of Typhus.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1959, v. 30, No. 7, 109–14, 1 fig. [Translated from Russian.]

The subjects of this study were 318 patients admitted to hospital in Kiev, of whom 156 had experienced previous attacks of typhus. No essential differences were observed between primary and secondary cases and the clinical picture was typical of louse-borne typhus except that the course of the disease was comparatively mild.

It was concluded both from the clinical and epidemiological findings and from the results of laboratory investigations that these sporadic cases were examples of European louse-borne typhus and not of murine rickettsiosis.

G. Covell

IGNATOVICH, V. F. **The Comparative Survival of** *Rickettsia prowazeki*, *R. mooseri* **and** *R. burneti* **during Vacuum Preservation.** (Author's summary.) *J. Microbiol., Epidemiol. & Immunobiol.* London. 1959, v. 30, No. 7, 150–51. [Translated from Russian.]

Egg infectivity titres of yolk sac preparations of *Rickettsia prowazeki* and *R. mooseri* diluted in various media and freeze-dried (2 hours at −18° to −20°C., then 6 hours at +18° to 20°C.; vacuum, 20–50μ) fell during drying by amounts up to 1 log unit when the diluting medium was skimmed milk or sucrose-milk (10% sucrose, 5% phosphate buffer, in skimmed milk). *R. mooseri* preparations dried in these media and stored in vacuum underwent no further loss of titre for 1–2 years, but *R. prowazeki* preparations lost another log unit of titre during 1 year of storage. After drying in buffered saline or peptone solution, titres fell much more rapidly. When diluted in skimmed milk, survival of both rickettsiae was equally good with concentrations of yolk sac ranging from 0·05–0·1 to 20–25%; with sucrose media, the infectivity of *R. prowazeki* dropped by 2–5 log units when the concentration of yolk sac was 0·1%, but by not more than 1–2 log units when the concentration was 10%. Variations in residual moisture from 0·7–1·32 to 3·3–4·3% did not affect survival over 1–2 years.

R. S. F. Hennessey

WEISS, E. & DRESSLER, H. R., with the technical assistance of I. E. FISHBURNE. **Selection of an Erythromycin-Resistant Strain of** *Rickettsia prowazekii*. *Amer. J. Hyg.* 1960, May, v. 71, No. 3, 292–8. [24 refs.]

Growth of the Madrid E strain of *Rickettsia prowazeki* in the egg was significantly inhibited by 12·5 μgm. of erythromycin per egg. When this strain was passaged serially in the presence of increasing amounts of erythromycin, resistance to the antibiotic developed after 12 passages to an extent which enabled growth to occur without evidence of inhibition in the presence of 1 mgm. of erythromycin per egg. The resistant strain had appeared by the 3rd and had predominated by the 6th passage; it was cross-resistant to carbomycin and oleandomycin, but not to *p*-aminobenzoic acid, chloramphenicol or tetracycline. The resistant strain resembled the parent strain in virulence for the chick embryo and cotton-rat, and retained its resistance after 10 serial drugless passages in eggs.

R. S. F. Hennessey

POSPISIL, R., POLONY, R., TARABCÁK, M., MITTERMAYER, T. & KRATOCHVÍL, I. Význam reakcie väzby komplementu pri laboratórnej diagnostike škvrnivky a jej recidívy. [**The Significance of the Complement-Fixation Test in the Laboratory Diagnosis of Typhus Exanthematicus and its Relapses**] Reprinted from *Sborník Prác Lekárskej Fakul. Univ. Komenského v Košiciach*. 1959, v. 2, Nos. 1/2, 55–62. 2 charts. [20 refs.] English summary (9 lines).

The authors have compared the results obtained in the Weil-Felix and complement-fixation tests in 15 cases of Brill's disease which occurred in the Košice area of Czechoslovakia between 1956 and 1959. The complement-fixation test was positive in all patients, with titres up to 5120; antibody had appeared by the 6th–8th day of illness, and attained maximum titres after 2–4 weeks. In 6 patients in whom the Weil-Felix test was also carried out the results were negative, or positive only in very low titres. It is therefore concluded that the complement-fixation test is the method of choice for diagnosing Brill's disease, and that the Weil-Felix test cannot be relied upon. The importance of detecting cases of Brill's disease is emphasized, since they may give rise to outbreaks of classical typhus in environments with bad hygienic conditions. *D. J. Bauer*

POPE, J. H., SCOTT, W. & DWYER, R. *Coxiella burneti* **in Kangaroos and Kangaroo Ticks in Western Queensland.** *Australian J. Exper. Biol. & Med. Sci.* 1960, Feb., v. 38, Pt. 1, 17–27, 1 fig.

Kangaroo ticks (*Amblyomma triguttatum*) have been found on sheep in an area where Q fever had occurred, and complement-fixing antibodies for *Rickettsia burneti* were detected in the sera of kangaroos collected in Queensland, the Northern Territory, and South Australia. In the studies now reported, 33 out of 141 sera (23%) from kangaroos collected in western Queensland gave positive reactions (titres of 1 in 8 or more) in complement-fixation tests and 38 out of 251 (15%) in agglutination tests with *R. burneti* antigens. Antibodies were found in 33% of sera from red kangaroos (*Magaleia rufa*) and in 12% of sera from grey kangaroos (*Macropus major*). A strain of *R. burneti* was isolated from the blood of 1 out of 24 kangaroos (a male *M. major*), and 13 strains were isolated from 122 batches of *A. triguttatum* (a total of 2,197 ticks). Of the 13 strains from ticks, 9 were from batches taken from kangaroos, the remainder from ticks collected from goats or sheep.

These results suggest that a natural kangaroo-tick cycle of *R. burneti* occurs in western Queensland; the host range of *A. triguttatum* would allow it to transmit infection to domestic animals, and it seems likely that infected ticks may have been the source of rickettsiae which caused recent outbreaks of Q fever among workers in the sheep-shearing industry. "Thus, the present work adds to current concepts of the epidemiology of Q fever, as it reveals a new significance of ticks of wide host range, in that infected ticks may be taken into contact with man by a host whose rôle may be merely that of mechanical carrier." [See also this *Bulletin*, 1959, v. 56, 1019.] *R. S. F. Hennessey*

YELLOW FEVER

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.

COURTOIS, G., OSTERRIETH, P. & BLANES RIDAURA, G. Isolement du virus de la fièvre jaune au Congo belge. **[Isolation of Virus of Yellow Fever in the Belgian Congo]** *Ann. Soc. Belge de Méd. Trop.* 1960, Feb. 29, v. 40, No. 1, 29–60, 3 maps & 1 graph. [Numerous refs.]

Although outbreaks of yellow fever had occurred in the Belgian Congo since 1912 and although since then the clinical diagnosis of the condition had been repeatedly confirmed by the results of serological tests [this *Bulletin*, 1949, v. 46, 136] on patients during and after their illness and of histopathological examinations of liver specimens obtained from fatal cases, all efforts at isolating the virus had proved unsuccessful. In the last quarter of 1958, however, in the region of Doruma in the Eastern Province, where previous immunity surveys had shown yellow fever to be endemic, there occurred a recrudescence of the disease, which afforded the authors an opportunity of visiting the affected area in person and undertaking the investigations, which finally led to the desired isolation of the virus. During the visit 40 of those suffering were clinically examined and of that number 5 were considered to be true cases of yellow fever, 7 to be probable cases and the rest to be, perhaps, cases of dengue fever. Serum specimens were obtained from all 40 patients and of these specimens 11 were proved to possess yellow fever neutralizing antibodies and, in the presence of mouse-brain antigen, 4 were found to contain complement-fixing antibodies and 11 to be anticomplementary.

For isolation of the virus simultaneous inoculations, by the intracerebral and intraperitoneal routes, were administered to 2–3-day-old mice and, in 3 instances, to *Macacus cynomolgus* monkeys. The inocula were of patients' sera in the early, acute stage of illness and, in 3 instances, of suspensions of liver substance obtained from fatal cases.

The first successful isolation was obtained from a 20-year-old male, whose serum was taken on the 3rd day of illness and inoculated into mice. The serum of this patient already contained neutralizing antibodies, but proved to be anticomplementary. The second and third isolations were obtained from a 20-year-old male, who died on the 4th day of illness. In this case virus was isolated in mice from serum taken on the 2nd day of illness and from a post-mortem liver specimen. Histological examination showed a typical picture of yellow fever hepatitis: the serum contained no neutralizing antibodies and was anticomplementary. The fourth, fifth and sixth isolations were obtained from a 25-year-old male, whose onset of illness occurred on the same day as that on which he had been inoculated with Dakar vaccine and whose death took place on the 6th day of illness. In this case serum taken on the 4th day of illness was inoculated into mice and into a *M. cynomolgus*. Virus was isolated in the mice, which showed signs of encephalitis between the 9th and 12th post-inoculation day. The *M. cynomolgus*, after being subfebrile, completely recovered, although its blood, taken on 2 occasions and inoculated into mice, revealed the existence of a viraemia. Serum taken from the patient on the 5th day of illness and inoculated into mice permitted demonstration of

the virus; on its inoculation into the monkey, however, there was no demonstrable viraemia. Virus was again isolated in both mice and monkey inoculated with post-mortem liver tissue. Proof of identity of the virus was established by serum-virus neutralization tests. As to the characteristics of the virus isolated: it was of relatively low virulence, as evidenced by its inability to kill *M. cynomolgus;* antigenically, however, it proved to be akin to, if not identical with, the Asibi virus and dissimilar from the French neurotropic virus.

During these investigations the authors also studied the epidemiology of yellow fever in the affected region, where many species of monkey and mosquito abound. Among the monkey population the forest canopy-dwelling *Colobus uelensis*, the *Cercopithecus ascanius* and the chimpanzee, *Pan troglodytes troglodytes* require special mention and among the mosquitoes, *Aëdes africanus, A. simpsoni* and *A. aegypti.*

An immunity survey of the human population in the region showed the combined percentage positive for both sexes in the age-groups (years) 0–10, 10–20, 20–30, 30–40 and 40 and above to be, respectively, 6·5, 30·5, 60·5, 82·5 and 81. Sero-protection tests proved also to be positive in one *Colobus uelensis* and in 26 (68%) of 38 chimpanzees (aged 1–8 years) collected from the region. Virus could not be isolated, however, from either sentinel monkeys (*M. cynomolgus*) stationed in the forest canopy or mice exposed in cages among the foliage.

In discussing their findings the authors suggest the mode of spread of the yellow fever virus from the forest to human habitations in the savannah. Transmitted from monkey to monkey (particularly *Colobus uelensis*) in the forest canopy by *Aëdes africanus,* the virus can rarely reach man; if, however, a single semi-arboreal monkey, infected in the canopy by *A. africanus,* descends to raid the savannah dwellers' plantations and is there bitten by *A. simpsoni,* this peridomiciliary mosquito can, after the period of extrinsic incubation, bite man and from then on a transitory man-mosquito-man cycle of infection may occur, in the absence of the monkey.

Finally, as to measures of control in the savannah: vaccination, regularly repeated to protect the non-immune younger generations, is the sole effective measure. *G. Stuart*

PANTHIER, R. & HANNOUN, C. La réaction de fixation du complément peut être un élément de diagnostic important en case de décès précoce au cours d'une fièvre jaune. [**The Complement-Fixation Reaction can be of Value in the Diagnosis of Yellow Fever when Death occurs in the Early Stage of the Disease**] *Bull. Soc. Path. Exot.* 1960, Jan.–Feb., v. 53, No. 1, 25–8.

As evidenced by experience in the Belgian Congo, the diagnosis of yellow fever by the histological examination of liver specimens, taken from suspected cases of that disease and forwarded for confirmation of the clinical opinion to the nearest pathological laboratory, has, in certain instances, proved difficult to establish, because of the fact that the criteria to be satisfied before such cases can be declared definitely positive have not yet been agreed. In the circumstances, the need for providing the pathologist, to whom the liver specimen has been consigned, with information likely to be of value in

enabling him to reach a definite diagnosis of hepatitis due to yellow fever is of obvious importance. Such information may, in the authors' view, be provided by acquainting the pathologist with the results of complement-fixation tests on the sera of patients dying during the acute early stage of the disease. In the present article the authors give examples of 2 recent cases, concerning which they were able to provide the pathologist with the type of information they advocate.

Of these 2 cases one occurred during the May 1958 outbreak of yellow fever in the Coquilhatville Province of the Belgian Congo, the other during the December 1959 outbreak in the Blue Nile Province of the Sudan. Serum A, from the Congolese case, and serum B, from the Sudanese case, were obtained from patients who died 4 and 3 days, respectively, after the onset of illness, the blood samples having been taken immediately after or before the time of death. In the performance of the complement-fixation tests by a modification of the Kolmer technique, these sera, as well as positive and negative controls, were mixed in dilutions of 1 in 5 to 1 in 160 with an antigen prepared from the brain tissue of 4-day-old mice infected with 100 LD50 of the Dakar strain of yellow fever virus and killed on the 5th post-inoculation day.

By application of this technique complement-fixation was shown to occur with both serum A and serum B to the following degree: with serum A, + in dilutions of 1 in 5 to 1 in 80 and ± in the 1 in 160 dilution; and with serum B, ++ in dilution 1 in 5, + in dilutions 1 in 10 and 1 in 20, traces in dilutions 1 in 40 and 1 in 80, and 0 in the 1 in 160 dilution. In comparison with these results it was found that the sera of persons previously unexposed to yellow fever or without history of yellow fever vaccination invariably proved, even when undiluted or in a 1 in 5 dilution, to be quite unable to fix complement, that the sera of vaccinated persons often showed a + degree of fixation in a 1 in 5 dilution and that the sera of those convalescent from yellow fever showed a ++ degree of complement-fixation in dilutions of 1 in 160 and above.

As regards the findings in serum A, it is of interest to note that the liver specimen taken from the Congolese case and forwarded for histological investigation to the Pasteur Institute, Paris, had, on examination by 2 pathologists, been regarded by one as from a probable case of yellow fever and by the other as from a suspected case. The provision of the complement-fixation test results in this case was obviously of assistance to the pathologists in enabling them finally to reach a definite diagnosis. *G. Stuart*

FEITEL, M., WATSON, E. H. & COCHRAN, K. W. **Encephalitis after Yellow Fever Vaccination.** *Pediatrics*. Springfield, Ill. 1960, June, v. 23, No. 6, 965–8.

This paper gives an account of what is probably the first case of encephalitis after yellow fever vaccination reported in the United States. The case occurred in a 10-week-old white baby girl, who had received 0·2 ml. of 17D vaccine 12 days before the onset of symptoms, which occasioned her immediate admission to hospital. Physical findings at the time of admission included a temperature of 39·2°C., irritability and a full anterior fontanelle;

there were also exaggerated deep tendon reflexes in the lower extremities and sustained clonus on the left. Blood examination showed a white-cell count of 14,850 per cmm., with 60% granulocytes, 32% lymphocytes and 8% monocytes. The cerebrospinal fluid contained protein 260 mgm.% and sugar 48 mgm.% and showed a white-cell count of 101 per cmm., with 65% granulocytes and 35% lymphocytes, no organisms in Gram-film and no growth on culture. Blood cultures were also negative for bacteria. From specimens of blood, cerebrospinal fluid and stools taken for virological study no adenovirus, ECHO, Coxsackie or yellow fever virus could be isolated.

Despite the lack of evidence of bacterial infection, the patient was given antibiotics as a precautionary measure. The clinical picture, including fever, irritability and full anterior fontanelle, remained unchanged during her first 3 days in hospital and then showed gradual improvement until the time of her discharge, 10 days after admission. The cerebrospinal fluid also showed gradual decrease in the number of cells and on the 9th hospital day contained only 17 cells, all lymphocytes. No obvious sequelae resulted from the illness.

In discussing the various views on the aetiology of encephalitis after the 17D vaccination of very young children (hypersensitivity to the antigen, increased neurotropic affinity of the virus, latent or inadequate antibody production, coincidence, etc.), the authors consider a coincidental cause to be unlikely. In the case now described no virus was isolated and no other cases of aseptic meningitis were seen at the time the patient became ill. Moreover a study of the relevant literature shows that the cases reported of encephalitis after yellow fever vaccination occurred during all times of the year and not only when the known types of aseptic meningitis could be expected.

From the negative results of attempts at virus isolation and from epidemiological criteria, the authors conclude that in the case described the administration of yellow fever vaccine caused the subsequent encephalitis.

G. Stuart

RABIES

RENOUX, G. Remarques sur la rage. **[Observations on Rabies]** *Bull. Acad. Nat. Méd.* 1960, v. 144, Nos. 21/22, 453–61.

In Tunisia, where the disease is enzootic, rabies constitute a serious public health problem. This is evidenced by the fact that in a country with a human population of just over 4 million the number of persons receiving antirabies treatment at the Pasteur Institute of Tunis totalled 25,062 in the 8-year period 1952–1959. Of that total 14,773 were given a complete course of treatment with phenolized vaccine containing 5% of brain tissue, the daily dosage and period of administration varying with the degree of exposure (from 4–5 to 10 ml. on from 16 to 20 consecutive days).

Of the 14,773 so treated 11 died of rabies—5 during treatment and 6 more than 14 days after its completion. Only 6 (0·04%), therefore, had to be considered as failures of treatment. Further evidence of the value of the

vaccination is afforded by the results obtained among persons bitten by animals proved to have been rabid at the time of biting: of 2,212 persons in this category only 1 (0·045%) died of rabies. Of 31 persons bitten by rabid animals and failing to attend for treatment, all died. Among the 14,773 persons who received a complete course of vaccine, as well as among the 10,289 whose treatment was discontinued after 10 days, there was no case of neuroparalytic accident.

As regards the epidemiology of rabies in Tunisia it has to be observed that whereas stray dogs and wild carnivores, such as jackals, constitute the principal reservoir of infection, transmission of the virus to man is mostly effected by household dogs. Other observations made by the author are noteworthy. The very frequent occurrence of rabies virus in the saliva and tears of human patients with the disease may make it advisable to administer specific treatment to those in close contact with such patients. In the diagnosis of human rabies an infallible sign is aerophobia, which is noticeable during the prodromal stage of the disease and which permits differential diagnosis between rabies and other forms of encephalitis to be made with certainty. Finally, in the developed attack of rabies the clinical course may be largely influenced by the patient's awareness of the nature of his disease. *G. Stuart*

McMillan, B. & Boulger, L. R. **The Susceptibility of the Ground Squirrel *Xerus* (*Euxerus*) *erythropus* Geoffroy, 1803, to Rabies Street Virus and its Potentiality as a Reservoir of Rabies in Northern Nigeria.** *Ann. Trop. Med. & Parasit.* 1960, June, v. 54, No. 2, 165–71, 1 map.

The people of Northern Nigeria, and particularly the Hausas in Katsina Province, firmly believe that a fatal madness follows the bite of the ground-squirrel *Xerus erythropus* in 1–6 months. As such a belief, associated with the bite of any animal in an endemic area, is suggestive of rabies, the authors investigated the idea by determining the susceptibility of the ground-squirrel to rabies street virus. To this end 2 attempts were made to infect ground-squirrels experimentally, the first at Kankiya in 1956 and the second at Yaba, Lagos, in 1957. For the Kankiya series of animal inoculations a 20% mouse-brain suspension, prepared from the first passage of virus from the salivary glands of a rabid dog, was used, and for the Yaba series the supernatant obtained by centrifuging a 10% suspension of the salivary glands of another rabid dog. The dose of inoculum employed in all cases was 0·2 ml. given intramuscularly.

At Kankiya 4 ground-squirrels were inoculated: 2 on 7th September and 2 on 17th September (from the same suspension); 1 of the 2 first inoculated died under the anaesthetic. On the death of the 3 remaining animals, the brain, spinal cord, parotid and submandibular glands, cervical lymph glands and liver were put up in 5% formal-saline and 50% glycerol-saline and sent to Yaba for examination; each tissue was examined microscopically and the glycerol specimens were washed in sterile water before suspensions were prepared for the mouse-inoculation test. At Yaba, of the 4 ground-squirrels sent from Kankiya for experimental infection, 2 died before the trial commenced and 1 of the 2 remaining died 24 hours after inoculation.

There was similarity in the clinical manifestations of the first Kankiya

squirrel and the Yaba animal (excitement and paralysis on the 16th–17th day), but the squirrels inoculated in the second series at Kankiya (on 17th September) differed, in that one presented a fulminating illness (marked excitement on the 13th day and death on the 14th) and the other followed a slowly progressive course, with lethargy noticeable from the 10th day to the 21st day, when death occurred. Histopathological examination in all 4 cases revealed the existence of encephalitis and thus permitted a diagnosis of probable rabies to be made. The presence of Negri bodies in the brains of the Yaba and first Kankiya squirrels confirmed this diagnosis. Although rabies street virus was not recovered from any of the Kankiya squirrels, it was isolated, titrated and identified from the brain and salivary glands of the Yaba squirrel. It was thus shown by syringe passage that *X. erythropus* is susceptible to rabies street virus by the intramuscular route, that the incubation period lies between 2 and 3 weeks and that the clinical signs do not differ markedly from those of other mammalian hosts.

Inasmuch as the ground-squirrel is very common in Northern Nigeria and is widely hunted for food with the aid of dogs, it is suggested that the hunters' dogs may infect the ground-squirrel and that transmission of the infection from this source to man has taken place in the past. "Because of a general fear of the bite of the ground-squirrel, its danger to man is now more potential than actual, but the animal must be considered if a rodent host of rabies in West Africa is postulated." *G. Stuart*

INTER-AFRICAN BUREAU FOR EPIZOOTIC DIS. (IBED). **Preliminary Examination of Questionnaire Data on Cases of Positive Canine Rabies in Africa.** *Bull. Epizootic Dis. of Africa.* 1960, Mar., v. 8, No. 1, 71–5.

In 1956 the Inter-African Advisory Committee on Epizootic Diseases recommended that a statistical survey should be initiated on rabies in Africa south of the Sahara. In late 1956, when it was agreed to implement this recommendation, a questionnaire was prepared and issued by the Inter-African Bureau for Epizootic Diseases (IBED), calling for data on the clinical and pathological aspects of each case of rabies occurring in that part of Africa. The information requested was with respect only to positive cases confirmed by laboratory examination. By mid-1959 a total of 1,343 questionnaires had been returned to IBED for analysis. The results of a preliminary examination of 495 of these questionnaires relating to positive cases of canine rabies in 23 different territories are given in the present paper.

Analysis of that part of the questionnaire dealing with the clinical aspects of positive cases showed: that among the 212 dogs of known age, 80 (37·73%) were under 1 year old, 32 (15·1%) between 1 and 2 years, 53 (25%) between 2 and 3 years and 47 (22·17%) over 3 years—figures suggesting an apparently greater susceptibility of dogs to rabies in their first 12 months of life; that among the 34 dogs stated to have been previously vaccinated against rabies, 6 died less than 1 week after vaccination and 7 between 1 week and 2½ months after vaccination—figures suggesting that several of the animals were already in the incubation period of the disease at the time of vaccination; and that in 414 cases, where the clinical type of rabies was stated, 311 (75%) were of the furious form and 103 (25%) of the dumb (paralytic) form.

Analysis of that part of the questionnaire dealing with pathological findings showed: that of the 495 cases proved positive for rabies by at least one laboratory method or another, only 78% were positive by histological examination and 74% by impression smears, whereas 94% were positive by the use of brain material, and 87% were positive by the use of salivary gland substance, as the inoculum for the performance of the biological test; and that among 241 cases, in which only a single method of examination was carried out (either histological or biological), 173 (88·72%) of 195 cases proved to be positive on histological examination and 46 (100%) of 46 subjected to the biological test—results emphasizing the fact that in laboratory diagnosis the biological test provides the more exact information.

As regards the value of the returns made to IBED by the various territories, it was felt that further useful information could be made available: (a) if more precise replies were made to the question relating to the suspected animal from which material is being sent for laboratory examination; (b) if the laboratory examinations included a routine stained impression smear and the use of salivary glands as inoculum in the biological test; and (c) if unconfirmed suspect cases were also included in the returns. *G. Stuart*

POUL, J. Etudes sur la vaccination antirabique des chiens en Algérie. [**Studies on the Antirabies Vaccination of Dogs in Algeria**] *Arch. Inst. Pasteur d'Algérie*. 1960, June, v. 38, No. 2, 196–215, 2 figs. [20 refs.]

For the eradication of rabies in Algeria, where the disease is enzootic and the dog the reservoir of the virus, canine prophylaxis on a very wide scale is clearly indicated. For such mass prophylaxis to be effective, at least 70% of the dog population should be vaccinated within the shortest possible period of time, say 2 weeks, with a vaccine of proved antigenic potency, one which can be administered in a minimal number of doses. Canine prophylaxis, as a routine control measure, has, in fact, been practised in Algeria since 1930 with a formolized vaccine: for primary immunization, 2 doses (a 21-day interval separating the doses) and for restimulation of immunity, a booster dose each year thereafter. Of the 350,000 dogs so vaccinated or revaccinated during the 30-year period 1930–1959, only 23 (0·007%) developed rabies. Although, therefore, the vaccination practised has apparently been highly satisfactory, it has always been difficult to evaluate vaccines on the basis of results obtained in large-scale vaccination, because, *inter alia,* of the lack of controls. Moreover the need is for an evaluation before a vaccine is released. The true index of a vaccine's protective value must, therefore, be determined in the laboratory and, in the author's view, such determination with respect to a vaccine intended for canine prophylaxis should be made on the dog itself, especially in view of the fact that, on intracerebral inoculation, dogs have been found to be as susceptible to infection with fixed rabies virus as other experimental animals.

In his search for a vaccine suitable for use in mass prophylaxis the author first investigated the degree of protection afforded by 22 different types of antirabies vaccine. Of these, which included formolized, phenolized and live-virus vaccines, only 3—2 phenolized and 1 live-virus (glycerinated 6·6%)—met

or exceeded minimum requirements for the protection of dogs challenged with the Tangier strain of fixed rabies virus. All 3, however, were unsuitable for mass vaccination, the phenolized because of the number of daily injections required (16) and the live-virus vaccine because of the risk attending its use.

The protective value of a vaccine inactivated by heat in the presence of antibiotics was then studied. This type of vaccine, prepared from sheep brain containing virus at its second or third passage in that animal and showing a virulence of 10^{-7} to 10^{-8} at the time when the sheep was killed, *i.e.*, 1–2 hours after the development of complete paralysis, had been found by RIBEIRO and FALÇAO (*Office International des Epizootics*, 1957, Rapport No. 478) to confer excellent protection on mice. The importance of killing the virus-producing animal at the time when the virus content of its brain is at its highest, *i.e.* soon after the development of complete paralysis, is emphasized, as the antigenic potential of an inactivated vaccine is proportional to the virus titre in the brain from which it is prepared. Bearing in mind that for the mass vaccination of dogs the least number of injections possible is a prerequisite, the author repeated on dogs the experiments of Ribeiro and Falçao by inoculating these animals with a similar type of vaccine in a dosage of 0·5 ml. per kgm. of body weight. In the author's experiments it was first ascertained that, in the presence of 500 units of penicillin and 0·5 mgm. of streptomycin per ml., the virus contained in a 30% suspension of brain material from a dog inoculated with the Tangier strain of fixed virus had, after 14 days' exposure to 37°C., completely lost its pathogenicity for rabbits and dogs on intracerebral inoculation. In trials of the vaccine's efficacy 20% suspensions of infected brain material was used, with either 0·05% of formol or 0·5% of phenol added. The results obtained from the vaccine first used proved to be unsatisfactory, the protection afforded falling short of minimum requirements.

In view of this failure an attempt was then made to increase the virulence of the Tangier strain by intracerebral passage of the virus from dog to dog. After 58 such passages the virus had a titre of $10^{-7\cdot33}$, as compared with one of $10^{-5\cdot2}$ in the brain-to-brain rabbit passages. Titrations on both dog- and rabbit-brain were made a few hours after the animals had become completely paralysed. The desired increase in virulence of the virus had thus been achieved by passage from dog to dog. Proof of the antigenic potency of a vaccine prepared from brain containing a virus of enhanced virulence through passage from dog to dog and inactivated by heat in the presence of antibiotics (as described above) is afforded by the following experiment. Intracerebral challenge of dogs 32 days after their subcutaneous inoculation with 0·5 ml. per kgm. of body weight of a vaccine, of which the antigen was the Tangier strain of fixed virus after its 43rd passage from dog to dog, showed the LD50 of protection to be 3·50.

A suitable method for canine prophylaxis by means of a single injection of inactivated vaccine had thus been found. Further experiments are now being undertaken to determine the duration of the immunity conferred and the keeping properties of the vaccine. *G. Stuart*

MÁLAGA ALBA, A. Patogénesis de la rabia de los murciélagos hematófagos. [**Pathogenesis of Rabies in Vampire Bats**] *Bol. Oficina Sanitaria Panamericana.* 1960, June, v. 48, No. 6, 475–6.

The author is a public health veterinarian of the Panamerican Bureau of Health, in Mexico. After a brief reference to the biting habits of bats and the danger of rabies in them, he points out that in vampire bats infected experimentally with rabies subcutaneously, virus could be isolated from the brain 9 days later and from the saliva 16 days later. Both in natural and experimental conditions apparently healthy vampire bats may harbour the virus and infect cattle and laboratory animals 5 to 7 months after it has been detected in the saliva for the first time [see also PAWAN, this *Bulletin*, 1937, v. 34, 677]. The author confirms Pawan's observations regarding the long incubation period in bats and quotes an average incubation period of 25 days (range 9 to 38).

The development of the disease is similar to that in other mammals. Sometimes there is a prodromal stage of 12–24 hours, during which the bat is apathetic and easily irritated. The excitable stage, which may be of long or short duration, soon develops, and the bat may attack man and animals violently and without fear. This stage may last for 1–5 days and terminate by apparent recovery or pass into paralysis and death. The paralytic manifestations are characterized by a paralysis of the Landry type, beginning sometimes with paresis and rapid paralysis of a limb. The wing muscles are most frequently affected, then those of the legs, eyelids, neck and lower jaw, in that order. Coma and death follow rapidly.

The author has observed transient and latent infections in some vampire bats, which develop convulsions and chronic spasms, but some recover without obvious sequelae. These attacks occur intermittently and seem to be provoked by irritant stimuli. Other bats are apparently resistant but may transmit infection although no symptoms are apparent. This resistance is either inherited or, more probably, due to inapparent infections, a point which has been established by the frequent demonstration of neutralizing antibodies in captured bats.

Despite the variety of clinical forms, it is noted, they may sometimes be reproduced by inoculation of strains of rabies virus from vampire or other bats or of fixed and street virus from dogs.

The presence of the virus in the mammary glands of insectivorous bats and in the brains of their offspring suggests a new form of perpetuation in a natural host. The infection in newborn bats is inapparent or subclinical and thus the virus may be maintained in bat communities.

The cerebral lesions in infected vampire bats are those of acute encephalitis, with the added characteristic of Negri bodies; sometimes inclusions and cellular changes similar to those produced by fixed virus are seen. Negri bodies are frequently found (1·9% to 14·4%) in apparently healthy bats [*ibid.*, 1949, v. 46, 254]. In Mexico, however, not more than 2% of brains from vampire bats examined contained Negri bodies.

In general the pathology of rabies in bats has not been fully studied, and the author suggests the need for basic studies to determine (1) the behaviour of rabies virus inoculated orally, subcutaneously and intracerebrally into bats, (2) the presence of the virus in the mammary gland and other tissues, (3) the level of neutralizing antibodies in the blood and milk of vampire bats, (4) the histology of the nervous system in bats carrying and dying of rabies.

H. J. O'D. Burke-Gaffney

CAJAL, N. & DĂNESCU-POPESCU, G. Cercetări asupra imunității antirabice la iepurii vaccinați cu tulpina "Flury" sub influența cortizonului. **[Investigation on Antirabies Immunity in Rabbits vaccinated with the Flury Strain under the Influence of Cortisone]** *Studii si Cercetări Inframicrobiol.* 1959, v. 10, No. 4, 447–53, 1 graph. [16 refs.] French summary.

The authors have investigated the effect of cortisone upon the immunity to rabies produced by live vaccine containing the Flury strain. Of 10 rabbits given cortisone acetate subcutaneously in a dose of 5 mgm. per kgm. body weight for 4 days and vaccinated intraperitoneally on the 3rd and 4th days 6 survived intramuscular challenge with street virus carried out 18 days after the last dose of vaccine, whereas 6 control animals given cortisone alone and 8 untreated animals all died as the result of challenge. 5 survived among 10 rabbits vaccinated on the 1st and 2nd days of cortisone treatment, and also 3 of 10 animals given vaccine alone. Very little neutralizing antibody could be found in the serum of the surviving animals treated with vaccine and cortisone, and their resistance to challenge was ascribed to the development of tissue immunity. *D. J. Bauer*

PLAGUE

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, rodent hosts, transmission, pathology, diagnosis, clinical findings, treatment, control.

ARONSON, M. & BICHOWSKY-SLOMNICKI, L. **Temperature and pH-Dependent Changes of Electrophoretic Mobility of** *Pasteurella pestis.* *J. Bacteriology.* 1960, May, v. 79, No. 5, 734–40, 3 figs. [14 refs.]

The synthesis of a new surface component of a bacterial cell can be detected by a change in the electric surface charge of the cell and can be measured by changes in electrophoretic mobility. The present study was undertaken to see if the temperature-dependent acquisition of resistance to phagocytosis by strains of *Pasteurella pestis* (*e.g.* as in antigenic fractions V and W) could be related to changes in electrophoretic mobility. It was found that the mobility of virulent and avirulent strains decreased after incubation of suspensions, under conditions where there was little or no evidence of multiplication of the organisms, at *p*H 6–6·7 and at a temperature of 37°C., but there was no change in electrophoretic mobility at either *p*H 6·0 at 30°C. or at *p*H 7·0 at 37°C. There was no evidence of correlation between mobility change and the ability to synthesize the VW antigen fractions or the fraction I. Under anaerobic conditions, or in the absence of a source of energy, mobility changes were not observed. Certain substances and specific conditions can modify the electrophoretic mobility changes. *H. J. Bensted*

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

MILLER, J. H. & SWARTZWELDER, J. C. **Virus-like Particles in an** *Entamoeba histolytica* **Trophozoite.** [Research Notes.] *J. Parasitology.* 1960, Aug., v. 46, No. 4, 523–4, 1 fig.

The authors, from Louisiana State University School of Medicine, found small particles in a section of a trophozoite of the NRS strain of *Entamoeba histolytica* during a study of the nuclear components by electron microscopy. The particles were arranged in an orderly manner in 3 groups near the nucleus: most of them were spherical and measured above 400 Å in diameter, but a few were ovoid. Each particle showed a well-defined limiting membrane and a fine granular matrix containing one or more electron-dense bodies. Their size and structure were compatible with virus particles as seen in sections by electron microscopy. The appearances are shown clearly in an electron microphotograph. Only one of several hundred sections of amoebae showed these particles.

The NRS strain had been maintained in the laboratory for more than 10 years on egg slants with buffered saline overlay, rice starch and mixed bacterial flora. The methods of preparing trophozoites from a 48-hour culture for electron microscopy are described.

Electron-dense particles, interpreted as chromatoid material, have been found in *E. invadens* by DEUTCH and ZAMAN (*Exper. Cell. Res.*, 1959, v. 17, 310) who noted the striking resemblance to virus particles: but the particles observed by the present authors in *E. histolytica* were more discrete and twice the size of these and were rare; in *E. invadens* they were uniformly present. At high magnifications the bodies seen in *E. histolytica* did not show a crystalline lattice structure. *H. J. O'D. Burke-Gaffney*

PAN, Chia-Tung. **Studies on the Monoxenic Cultivation of** *Entamoeba histolytica* **with Hemoflagellates.** *J. Infect. Dis.* 1960, May–June, v. 106, No. 3, 284–9. [21 refs.]

PHILLIPS [this *Bulletin*, 1950, v. 47, 624 and 741] showed that *Entamoeba histolytica* could be grown in absence of bacteria by replacing them with *Trypanosoma cruzi*. Attempts have now been made to improve the culture medium used by the original author and use it at a temperature other than 37°C. in absence of strict anaerobic conditions. The replacement of *T. cruzi* by other haemoflagellates was also tried.

Four strains of the large race of *E. histolytica* were used and the following species of haemoflagellates in addition to *T. cruzi*, namely *T. lewisi*, *Leishmania donovani*, *L. braziliensis*, *L. enriettii* and *Endotrypanum schaudinni*. Besides cultures in NNN medium the flagellates were maintained in a new medium containing penicillin and streptomycin which will keep well and whose composition is given. Additions to this medium were made when amoebae were present. The amoebae were freed from accompanying bacteria after 3 transfers in presence of antibiotic. Subcultures of amoebae in presence of

haemoflagellates were usually made twice weekly. Incubation temperatures were 33° and 35°C., and standard inocula were given. The amoebae and flagellates were counted in a haemocytometer, after stabilization of the cultures at 24-hour intervals by dilution with 10% formalin.

It was found that the amoebae could be cultured at the above temperatures with all the above species of haemoflagellate, but not with equal facility. Results were best in presence of *T. cruzi*. The results at the two temperatures of cultivation also varied. The absence of anaerobic conditions through the use of vaseline seals or reducing agents in the medium is noteworthy.

J. D. Fulton

GLEASON, Neva N., GOLDMAN, M. & CARVER, R. K. **An Enriched, Egg Extract Medium for recovering Viable *Entamoeba histolytica* Trophozoites from Fecal Suspensions kept at Room Temperature for Four Days.** *Amer. J. Trop. Med. & Hyg.* 1960, Jan., v. 9, No. 1, 46–9.

The authors describe a method for preserving viable trophozoites of *Entamoeba histolytica* in faeces, which can be despatched to remote laboratories for diagnosis or for maintenance of strains. The medium is prepared as follows: to 5 parts of Balamuth's egg extract without liver is added 1 part of a solution containing 100 ml. Locke's solution composed of 110 mgm. dextrose, 2 mgm. trypticase and 50 mgm. sodium thioglycollate; this medium is poured into test-tubes (6 ml. each).

Tests were made with 3 strains of *E. histolytica* and 2 *E. hartmanni*, cultured trophozoites of which were placed in the above medium together with 0·5 ml. of normal human faecal suspension, as well as 1000 units/ml. of penicillin and 2–3 mgm./ml. streptomycin. The tubes were kept at 25°C. for 1–4 days. After they had then been incubated at 37°C., viable amoebae were recovered from all tubes stored for 1–2 days, and from 75% of those stored for 3–4 days. In field trials, similarly prepared amoebic cultures and infected material from stools were sent to the laboratory from Texas and Mississippi respectively. After the tubes had been in transit for 2 days, they were cultivated at 37°C., with positive results in all cases.

C. A. Hoare

FUKUHARA, F. **[Immunological Studies on *Entamoeba histolytica*. 2. On Complement-Fixation Test, Precipitation Test and Immobilization Test]** *Japanese J. Parasit.* 1960, Apr., v. 9, No. 2, 145–9, 1 chart. [12 refs.] [In Japanese.]

The English summary appended to the paper is as follows:—

"Complement-fixation test (CFT), immobilization test (IMT) and precipitation test (PT) were carried out with a rabbit antiserum. The rabbit was immunized through 5 intravenous injections of 200,000–400,000 amoebae with the intervals of 5 days. Whole blood was shed 10 days after the last injection and the serum obtained was inactivated, added with merthiolate and kept in ampules at 4°C. The antigen for CFT and PT was made by destroying amoebae with irradiation of sonic vibration.

"CFT proved positive at the dilution of 1:64 while PT was almost negative even with the undiluted serum. IMT was definitely positive with undiluted and 1:2 diluted sera. The immobilization attained maximum 30–40 minutes

after the amoebae were immersed in the antiserum. The control tests carried out with serum immunized with associated bacterial flora gave negative results in all tests. CFT and IMT may be prospective for clinical use."

ACTA MED. COSTARRICENSE. 1958, Aug., v. 1, No. 3, 179–218. Amibiasis. I. Consideraciones sobre la amibiasis en el Hospital San Juan de Dios. **[I. Observations on Amoebiasis in the San Juan de Dios Hospital, Costa Rica]** [CORDERO, R.], 179–84. II. Experiencia anatomo patológica. Estudio de 3220 autopsias. **[II. Pathological Features in 3,220 Autopsies]** [CÉSPEDES, R.], 185–207, 20 figs. on 5 pls. [12 refs.] English summary. III. Revision de la terapéutica antiamebiana. **[III. Review of Therapy of Amoebiasis]** [TREJOS, F.], 209–18.

These 3 papers form part of the proceedings of the 27th National Medical Congress of Costa Rica which met in November 1957 and had for its theme the subject of amoebiasis: further papers are to appear in future publications.

I. Cordero analysed statistics for amoebiasis from the San Juan de Dios Hospital over the last 5 years in terms of several diagnostic features, which are listed. Of 252 cases diagnosed as amoebiasis only 120 were confirmed by the strict criteria set out by the author. These 252 cases were included in a total of 139,070 in-patients, so that the incidence in that hospital was considerably lower than that found in most of the Latin-American countries.

The 120 proved cases included 71 true clinical dysenteries, there were 13 cases of amoebic hepatitis (7 of them associated with dysentery), 21 hepatic abscesses and 1 amoeboma. These types are discussed briefly. 9 of the patients with liver abscess died. Of the whole number of 120 patients with proved amoebiasis, 89 were under 41 years and no less than 33 were under 10 years.

II. The author, from the Department of Pathological Anatomy, San Juan de Dios Hospital, had noted in the 8 years 1950–57 that in respect of amoebiasis the clinical and laboratory findings did not always correspond with the pathological findings. He therefore studied the results of 3,220 autopsies on patients aged 3 months to 90 years, and 63 of those revealed evidence of ulcerative colitis which might have been of amoebic origin. At autopsy it was found that *Entamoeba histolytica* could be incriminated in 36 (11·18 per 1,000) of all autopsies: 9 of these were associated with liver abscesses and 4 others had liver abscess only. There were thus 40 cases (12·4 per 1,000 of the total) of amoebic origin. Half of the patients were aged 30 to 60 years and one-quarter each above and below these extremes. The youngest was aged 4 months and all but 5 came from rural areas. Only 11 could be said to be pure amoebiasis: 20 had debilitating lesions, such as malnutrition, cancer or worm infections and the remaining 9 had other diseases.

The pathological findings are discussed at length and illustrated in 11 photographs, 7 photomicrographs and 2 radiographs. Of the 36 cases of intestinal amoebiasis, 31 were sub-acute, 2 were acute, one was a necrotic form without ulceration and 2 were chronic. Of the 13 hepatic lesions, 11 had a single abscess, one had 2 and one had 3.

Complications included acute peritonitis in 9 (7 due to perforation), 8 cases of thrombo-embolism (5 pulmonary), 1 each of acute endocarditis and pericarditis, 3 empyemas, and one case of renal cortical necrosis in a child with

massive *Trichuris* infection and anaemia. Finally, there was a case of toxic hepatitis, attributed to arsenic, in a patient of 65 who had received carbarsone and emetine simultaneously.

Clinical diagnosis of amoebiasis was correct in 12 cases, had been suspected in 7 and was incorrect in 21. Laboratory diagnosis from examination of faeces had been made in only 9 cases, and the need for more precise methods of diagnosis is emphasized.

III. This paper reviews all the principal drugs used in amoebiasis under 6 headings, giving for each the formula, mode of action, dosage and administration, toxicity and efficacy. The paper ends by setting out the fundamental principles of treatment. *H. J. O'D. Burke-Gaffney*

ALBORNOZ PLATA, A. Eritromicina-carbarsone en el tratamiento de la amibiasis. [**Erythromycin-Carbarsone in the Treatment of Amoebiasis**] *Rev. Facul. de Med.* Bogotá. 1959, Oct.–Dec., v. 27, Nos. 10/12, 235–44, 5 graphs. English summary.

The author, from Colombia, studied the effect of erythromycin-carbarsone (Lilly Laboratories) in the treatment of 26 patients with acute (4) or chronic (22) amoebiasis: 17 suffered from other diseases in addition and 9 harboured other parasites as well as amoebae. The patients were aged 6 to 56 years.

The preparation is marketed in tablets containing 125 mgm. of erythromycin (Iloticin, Lilly) and 100 mgm. of carbarsone. The dose for adults was 4 tablets daily for 10 days: children received half of this dosage. All patients were followed up by stool examination and, in adults, by rectosigmoidoscopy.

The results are shown in detail in 7 tables and 5 figures and some illustrative cases are described. On clinical grounds, results were classified as excellent in 9 patients, very good in 3, good in 12 and poor in 2. 18 patients showed improvement in the first 5 days and 4 of them in the first 2 days: a few took up to 20 days. Stools became negative in 6 days in 21 patients: one patient remained positive after 15 days. 5 patients had side effects of a mild nature, not requiring interruption of treatment; otherwise tolerance was excellent. The treatment did not affect concomitant disease, but in 2 patients with *Iodamoeba* and 2 of 3 with *Giardia*, the parasites disappeared: there were 6 patients with *Ascaris* and 2 with *Trichuris*, but these parasites were not affected by the treatment.

It is concluded that the combination erythromycin-carbarsone is effective in the treatment of amoebiasis and is well tolerated. *H. J. O'D. Burke-Gaffney*

DONCKASTER, R. & DONOSO I., A. Ensayo terapéutico de la amibiasis intestinal crónica con Demetilclortetraciclina. Probable acción de este medicamento sobre la giardiasis. [**Treatment of Chronic Intestinal Amoebiasis with Demethylchlortetracycline. Probable Action of this Drug in Giardiasis**] *Bol. Chileno de Parasit.* 1960, Apr.–June, v. 15, No. 2, 31–4. [15 refs.]

The English summary appended to the paper is as follows:—

" 1.—The preliminary results in 18 cases of human chronic amebiasis treated with Demethyl-chlortetracycline are reported. 250 milligrams of the drug, three times a day and far from meals, were given for ten consecutive days.

"2.—Success of treatment was estimated by serial stool examinations, starting at the 10th, 40th and 90th day after last dose of drug. Concentration (modified Telemann) and P. V. A. procedures were applied to each fecal sample.

"3.—78% of the patients were cleared of the parasite after 10 days and 86% after 40 days of last dose of drug. 6 out of 7 patients with concomitant *Giardia lamblia* infection were cleared of the parasite, a fact which has not been reported with other antibiotics.

"4.—Intolerance to the drug was often observed (89%) but symptoms disappeared after treatment was completed."

BERGMANN, F., REITLER, R., CHAIMOVITZ, M. & BERGMANN, D. **Pharmacological Study of a New Antibiotic of Bacillary Origin.** *Brit. J. Pharmacol. & Chemotherapy.* 1960, June, v. 15, No. 2, 313–18, 7 figs. [11 refs.]

Extracts from the mutant of a Gram-negative bacterium isolated from human mesenteric glands caused marked clinical improvement in patients infected with *Entamoeba histolytica* even before disappearance of parasites. It was therefore thought that a substance which acted on smooth muscle might be present as well as the antibiotic material which affected the amoebae. The antibiotic material was named Colisan. It caused lysis of *Paramoecium caudatum* at a dilution of 1 in 200. It also caused a diminished response of guineapig ileum to acetylcholine and the effect was reversible. Colisan also abolished peristaltic movements of the guineapig colon. The relaxing effect of the substance was observed also against other stimulants such as histamine, 5-hydroxytryptamine, nicotine, γ-aminobutyric acid and barium chloride. The contraction of other smooth muscle organs such as uterus, ureter, bladder and stomach were affected like the intestine. On stimulated striated muscle Colisan had no effect. Intravenous injection in the intact dog or cat caused a fall in blood pressure which returned to normal and again fell. This fall was corrected by adrenaline.

The material thus appears to contain a relaxant with a wide range of activity which acts directly on the muscle cell, a property which can be overcome with high doses of stimulant drugs. The properties of Colisan are compared with those of tissue extracts described by other workers and appear to be different. The relaxant action on gut is probably responsible for the clinical improvement in patients with amoebiasis before antiprotozoal action is apparent. Whether the relaxant principle is the same as the substance which causes amoebae to disappear is being investigated. *J. D. Fulton*

BERGMANN, F., REITLER, R. & CHAIMOVITZ, M. **[The Action of a New Antibiotic ("Colisan") on the Smooth Muscle of the Intestine (Preliminary Note)]** *Harefuah.* Jerusalem. 1960, July 1, v. 59, No. 1, [in Hebrew 12–13. English summary 13].

The English summary appended to the paper is as follows:—

"From the mesenterial lymphatic glands of a patient who succumbed to ileus, a bacterial strain was isolated, with the following properties: after 24

hours' growth the cells stain gram-negative; after 3 days abundant spore formation; no fermentation of sacharose lactose, maltose or dulcite. This strain is related to Bacillus brevis, but is different from it in its morphology and antibiotic properties.

"Mutants of the new strain showed antiprotozoal effects, in addition to antibacterial activity. A purified extract of the mutant RB—103 ('Colisan') served for the treatment of amebiasis.

"Pharmacological experiments with this extract revealed an antagonistic effect against various stimulants (acetylcholine, histamine, serotonine, nicotine or barium chloride) of the small and large intestine of the guineapig. This effect is competitive and reversible.

"The antispasmodic spectrum of Colisan is much broader than that of other known smooth muscle relaxants. These findings may explain—at least in part—the observation that in the treatment of amebiasis with Colisan clinical improvement takes place ahead of the disappearance of the parasites from the stools.

"It is still undecided whether or not the parasitotropic factor is identical with the factor that acts on the smooth muscle."

De Carneri, I. Les bases biologiques de la prophylaxie des amibiases. [**Biological Basis for the Prophylaxis of Amoebiasis**] *Bull. World Health Organization*. Geneva. 1960, v. 23, No. 1, 103–11. [Numerous refs.]

Amoebic dysentery and its complications undoubtedly constitute a problem of magnitude in some parts of the world; the published records of their incidence vary much from one area to another, but these reports often cannot be accepted without qualification. The *minuta* form of the parasite lives commensally, and therefore harmlessly, within the bowel; this form measures 10 to 20μ in the amoeboid state. This must be differentiated from *E. histolytica*, the haematophagous invasive, and therefore pathogenic, type in which the amoeboid stage measures 20 to 30μ. This differentiation has been overlooked in some of the records cited, thereby limiting their value. Nevertheless, most workers agree that pathogenic strains of *E. histolytica* can remain quiescent, in the *minuta* form, as commensals within the bowel for lengthy periods; for reasons not understood, they may then become pathogenic and assume the *histolytica* form.

Some published data indicate that more than 20% of those suffering from active bowel lesions develop extra-intestinal complications due to metastasis of the parasites. Amoebic colitis can be eradicated [parasitically cured] in many cases by treatment with a variety of amoebicides, or with antibiotics; but chronic amoebiasis must still be regarded as one of the most difficult infections to clear. Even when parasitic sterilization is achieved by chemotherapy, in old-standing severe cases there will remain permanent damage to the bowel wall, with scarring and stenosis. For these reasons prophylactic chemotherapy against the infection merits consideration. Before considering chemoprophylaxis against amoebiasis on a world-wide scale certain facts must be elicited such as:—whether there are consistently non-pathogenic species of the parasites—such as Brumpt's *E. dispar*—which can be ignored; what in a given area is the incidence of pathogenicity among those shown to harbour *E. histolytica*

infections? In countries like England the occurrence of amoebic dysentery is excessively rare; elsewhere the ratio of pathogenicity to non-pathogenicity has been reported to range from 1/300 to 1/3. Obviously in those countries where the incidence of pathogenicity is negligible, in spite of an appreciable incidence (up to 10%) of parasitization among the population, prophylactic chemotherapy is superfluous; but where evidence of pathogenicity is common it becomes desirable. While the incidence of the infection in institutions and in controlled populations has been reduced by chemotherapy, the difficulties in similar control of the infection on a large scale are manifest; and in the latter case re-infection from outside sources is much less amenable to control.

The best time to attack an *E. histolytica* infection is promptly after its introduction into the large intestine before tissue invasion has occurred. The period which may elapse before the latter takes place can vary greatly; probably it is governed by factors including the weight of the initial infection and the virulence of the infecting strain. Diet may affect it and concomitant intestinal parasitisms doubtless have an influence on it. Any amoebicidal agent selected for mass chemoprophylaxis should exert an action restricted to the amoebae; it should not be absorbed to an appreciable extent from the bowel, and it should be harmless to the host. Cost is an important consideration in any large scale chemoprophylactic scheme in the densely populated impoverished countries.

There are several reports on the chemotherapy of *E. histolytica* infection in collections of people in institutions, or similarly controllable aggregations. Several of the recognized amoebicidal drugs have been used in these experiments. Some of these drugs were given continuously, others intermittently. The data suggest that any drug so far used must be in contact with the amoebae for at least 24 hours effectively to destroy them; therefore successful interrupted dosage involves treatment for at least 2 consecutive days each week. [The author gives no indication that he personally regards any drug régime so far tried as either suitable or adequate for general use.]

A. R. D. Adams

PAN, Chia-Tung. **Nuclear Division in the Trophic Stages of** *Iodamoeba bütschlii* **(Prowazek, 1912) Dobell, 1919.** *Parasitology*. 1959, Nov., v. 49, Nos. 3/4, 543–51, 32 figs. on 3 pls. [19 refs.]

Iodamoeba bütschlii is the only human intestinal amoeba, the nuclear division of which has hitherto not been elucidated. This gap in knowledge has now been filled by the author of the present paper, in which a detailed account is given of this process, as studied in material obtained from a woman who lived in India and Ceylon and was passing trophozoites and cysts of this amoeba. Faecal smears were fixed in Schaudinn's fluid containing 5% acetic acid and stained chiefly with Heidenhain's iron haematoxylin.

In the resting stage (interphase) the nucleus contains a large central karyosome (endosome), while the space between it and the nuclear membrane is typically occupied by one row of periendosomal granules which are connected to the karyosome by fibrils. During prophase these granules become incorporated in the karyosome which assumes a spindle shape, while the granules, which are at first coarse, are later transformed into 20 or more fine granules,

representing chromosomes that move to the equatorial zone of the karyosome. During metaphase, spindle fibres bearing a dark dot [centriole] at each pole are formed, and the chromosomes separate into two sets of about 12 in each. At anaphase the daughter chromosomes move to opposite poles, and—in telophase—they first form two polar clumps, then the 2 karyosomes release the periendosomal granules and reorganize, after which the daughter nuclei separate. The nuclear membrane is retained throughout the entire process of mitosis. Finally fission of the cytoplasm (cytokinesis) takes place and 2 daughter amoebae with nuclei in the resting stage are produced.

The whole process of nuclear division—which differs from that in the other parasitic amoebae of man—is depicted in a series of figures. *C. A. Hoare*

LEON, L. A. & DE LEON, Bianca C. Eimerias y eimeriasis en patología humana. [**Human Eimeriasis**] Reprinted from *Medicina*. Mexico. 1959, July 10, v. 39, No. 823, 283–90, 7 figs.

[At one time it was thought that man was liable to infection with coccidia of the genus *Eimeria*, of which 3 species had been recorded from human faeces between the years 1915 and 1921. However, THOMSON and ROBERTSON (this *Bulletin*, 1926, v. 23, 703) demonstrated conclusively that the coccidia in question were merely "gut-passers", *i.e.* parasites of food animals, *viz.* fish. When these are eaten by man, the oöcysts are voided with the stools without establishing an infection in his intestine. Since that time it has generally been held that man may be parasitized only by coccidia of the genus *Isospora*.]

In the present paper the authors describe 2 new species of *Eimeria* recovered from man in Ecuador. One, named *E. intestinalis* n.sp., was found in 2 persons, whose stools contained oöcysts and spores (measuring 44–53 × 28–34μ) with 2 U- or O-shaped sporozoites, as well as detached cells of intestinal epithelium enclosing young and mature schizonts, and also merozoites. These elements are illustrated in photomicrographs. [However, the bodies supposed to show "spores" bear a strong resemblance to nematode eggs of the *Strongyloides* type, while the contents of the desquamated epithelial cells have nothing in common with coccidial "schizonts".] The "parasite" in question is said to be pathogenic to man, causing various clinical manifestations of intestinal "eimeriasis".

Under the name *Eimeria manson-bahri* n.sp., the authors describe spherical and oval oöcysts (measuring 37 × 37μ and 46 × 34μ respectively) in different stages of sporogony, which were found post mortem in sections of the liver from a patient who died of peritonitis and showed symptoms of tachycardia, diarrhoea and hepatomegaly, all of which are attributed to a condition called "eimeriasis hepatica". Photomicrographs illustrating this case show structures somewhat like coccidial oöcysts with unsegmented zygotes and sporoblasts, as well as a [dubious] spore.

[While the nature of "*E. intestinalis*" is open to serious doubt, that of "*E. manson-bahri*" is in need of confirmation: it will be recalled that several cases of alleged human hepatic coccidiosis, attributed to *E. gubleri*, are on record (see *ibid.*, 1919, v. 13, 351).] *C. A. Hoare*

LEPROSY

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

COCHRANE, R. G. **Leprosy in England and Wales.** Reprinted from *Med. Press.* 1960, Jan. 27, 77–80.

The author, who is the Advisor in Leprosy to the Ministry of Health, London, first describes shortly the recent history of leprosy in England and Wales. The last old-time indigenous case of leprosy in the British Isles was in Shetland in 1798, but since then 3 other indigenous cases have been reported [this *Bulletin*, 1938, v. 35, 545]. In 1951, leprosy became a notifiable disease in England and Wales, but because of the exaggerated fear of leprosy among the general public notification is strictly confidential. As isolation is not compulsory, the Medical Officer of Health in the district is informed by the Advisor in Leprosy of any existing cases. Particulars are given of the nature of leprosy, the methods of its spread, and the simple precautions to be taken. Among diagnostic particulars, the history of having resided in a country where leprosy is endemic is of primary importance. In many cases it is important to have the diagnosis confirmed by examination of biopsy material. But unless the physician has experience in the treatment and management of leprosy it is wise to seek the advice of the Ministry of Health, or refer the patient to one of the hospitals for tropical diseases. In some instances when hospitalization is necessary the patient may be sent to one of the two leprosy hospitals.

Reference is made to the Leprosy Sub-Committee of the Colonial Medical Research Council which stimulates interest in leprosy research, gives expert advice on research, and in suitable instances financial aid. In 1951 it was known that there were at least 60 or 70 cases in Britain but it is now known that there are many more, and there are "British citizens returning from abroad who will, from time to time, enter the country with leprosy, and it follows that this is a problem which must be faced from a normal Public Health angle". But it is important also, because of the mental distress caused, to appreciate the particular difficulties of patients and the psychological strain inherent in the knowledge that they have leprosy. *Ernest Muir*

GANGULY, N. **Investigation of Leprosy Problem in Ausgram and Guskara Unions of Ausgram P.S., Dist. Burdwan, West Bengal.** *Leprosy in India.* 1958, Apr., v. 30, No. 2, 121–8.

A leprosy survey was conducted in 2 village unions of the Ausgram area of the Burdwan District of West Bengal, with a population of 18,110. 7,524 persons were examined and 188 (2·49%) were found to have leprosy, about one-third of them with the lepromatous form of the disease. Of the 6,830 males examined, 134 (1·9%), and of the 694 females examined, 54 (7·9%), were found to have leprosy [showing the importance of examining the total population]. Recommendations are made, including the appointment of a whole-time trained Medical Officer for leprosy work. *Ernest Muir*

UTTLEY, K. H. **The Mortality from Leprosy in the Negro Population of Antigua, West Indies, from 1857 to 1956.** *Leprosy Review.* 1960, July, v. 31, No. 3, 193–9. [Numerous refs.]

During the 100 years from 1857 to 1956 the coloured population of Antigua fell from 36,000 to 28,800 in 1921, and then rose rapidly to 54,200 in 1956. A table gives registered deaths per decade for people suffering from leprosy, varying from 51 between 1897 and 1906 down to 12 in the last decade. The total in the whole period was 305 patients, of whom 158 were males and 147 females.

For the 40 years up to 1906 the death rate was remarkably steady, as was also the percentage of leprosy deaths in all deaths; since then the mortality from leprosy has been steadily falling. It is acknowledged that in many instances leprosy patients may have been entered in the registers as dying from diseases other than leprosy. *Ernest Muir*

GHOSH, S., BASU, S. P. & MUKERJEE, N. **Effect of Roentgen Rays on** *Myco. leprae*. *Leprosy in India.* 1958, July, v. 30, No. 3, 150–53. [29 refs.]

A. MUKHERJI [this *Bulletin*, 1958, v. 55, 523] claimed that leprosy bacilli either became beaded, or were disintegrated without damage to the tissue cells, when excised lepromatous tissues were subjected to prolonged irradiation with small doses (63 r to 84 r). The present authors therefore removed tissues from the ear of a patient suffering from lepromatous leprosy by biopsy and exposed this tissue to a deep X-ray therapy plant working at 140 KVP (5 MA, distance 150 cm., $\frac{1}{2}$ mm. copper filter). Exposures were made on 4 days for periods rising from 15 to 55 minutes. Smears from the same tissues were also irradiated by this method, and also at 75 cm. distance with a $\frac{1}{4}$ mm. copper and a 1 mm. aluminium filter.

There was little difference in the bacilli on Ziehl-Neelsen staining between the irradiated and the non-irradiated specimens, and the tissue cells of the irradiated specimens showed no detectable change from the effects of irradiation. *Ernest Muir*

RIDLEY, D. S. **The Comparative Action of Chemotherapy on** *M. leprae* **in Superficial Tissues and in the Reticulo-Endothelial System.** *Leprosy Review.* 1960, July, v. 31, No. 3, 189–92.

The question is raised whether the reticulo-endothelial system acts as a reservoir of bacilli and possibly as a source of re-infection after treatment. The material used for investigation is post-mortem material from 4 untreated lepromatous subjects, and specimens from 8 leprosy patients at different stages of treatment.

The results are summarized in a table. They show that under chemotherapy bacilli generally disappear from the reticulo-endothelial system before they do from the skin, nerve or testis. It is known that the reticulo-endothelial system has a primary function of collecting and disposing of foreign particles and noxious agents. It is assumed that the bacilli in the liver and the spleen are

there only because they have been filtered off from the blood-stream. "In lepromatous leprosy, in which the tissue reaction to *M. leprae* is quite passive, it is likely that the RES is the principal site of destruction of the bacterial bodies. When infection is arrested and the inflow of bacilli to the liver and spleen is reduced, numbers rapidly decline." *Ernest Muir*

VINGIANI, A. Aspetti istologici atipici della lebbra cutanea. [**Atypical Aspects in the Histology of Cutaneous Leprosy**] *Acta Med. Italica.* 1959, June, v. 14, No. 6, 146–50, 6 figs. [21 refs.]

The author gives reproductions of the microscopic appearance of tissue in 6 sections taken by biopsy from patients with leprosy seen in Naples. The cases were of a type in which the search for *Mycobacterium leprae* is often unsuccessful and the course of the disease is clinically mild. Here the infecting agent produces what is a mainly epithelioid reaction. The tissue sections were stained with haematoxylin and eosin and with Unna-Pappenheim stain to show up the plasma cells.

One specimen, from a face nodule, shows a uniform epithelioid structure; another includes a few giant cells in addition. Another specimen, from the forearm, shows granulomatous tissue with small proliferative centres in the thickness of the derma, indicating an earlier stage of development. In another section a sleeve-like perivascular infiltration in the dermal layer can be seen; in another case the process is seen to have advanced further with the development of lymphoid and epithelioid cells and evidence of histiocytosis. One specimen, from a lesion on the lip, shows a cellular infiltration around the nerve bundles: oedema and then sclerosis occur in the myelin sheath in due course and fragmentation of the axis cylinder takes place. The remaining tissue specimen is shown under two magnifications and its predominant histological feature is provided by plasma cells.

Vingiani believes that "borderline" types [WADE, this *Bulletin*, 1956, v. 53, 1350] are a well-defined variety of the disease and correspond to an intermediate stage in evolution between the lepromatous and the tuberculoid types. *J. Cauchi*

BROWN, J. A. K. & STONE, M. M. **Lepromin Sensitivity.** *Leprosy Review.* 1960, July, v. 31, No. 3, 172–7. [10 refs.]

The authors first repeat their experience of the advantages of the multipuncture depot lepromin test [see this *Bulletin*, 1960, v. 57, 136]. They find that this correlates well with the classical lepromin test.

By using this test, and also by using either the Mantoux test (5 TU) or the Heaf multipuncture method, the authors tested 9 groups of children to find out the effects on the lepromin reaction of BCG and of tuberculin. In 472 children with only the one lepromin test, 56% gave a positive lepromin reaction. In 255, with Heaf tuberculin and depot tests given together, 59% were positive. In 124 children with the Heaf test 5 weeks earlier, 55% were positive. In these 3 groups there was no significant difference. In 2 other groups with respectively the Mantoux 6 months before the lepromin, and with the Heaf

test 5 weeks before, both of these groups having been given BCG, the percentages of positives were 86 and 87. Thus, with BCG the percentage of positives was higher by 29 than those without BCG. In other groups, it was shown that the lepromin positive rate was significantly higher among the tuberculin negative children who converted after BCG than among those already tuberculin positive.

In another experiment in 644 children without BCG 36% were Grade I lepromin positive and 24% Grade II; while of 281 comparable children vaccinated with BCG the figures were 32% and 58%.

Comparing 1 in 20 with 1 in 100 depot lepromin, 59% were positive with the former and only 45% with the latter; however, where lepromin is scarce the weaker dilution "will safely indicate those who need further protection".

When lepromin reactions were examined in each of 6 two-year age-groups (5 and 6 up to 15 and 16) the percentage of positives gradually rose from 29 to 78 without BCG, whereas with BCG the positives at the highest age-group were 86 to 87%. A measure like BCG vaccination which will give even this degree of higher positivity "is worth considering. It could certainly do no harm". *Ernest Muir*

CHAUDHURI, S. K., BASU, S. C. & CHAKRABORTY, D. K. **Premonitory Symptoms in Leprosy.** *Leprosy in India.* 1959, July, v. 31, No. 3, 85–9.

A study was made of 122 patients chosen from the general out-patient department of a hospital at Bankura in West Bengal. They were given symptomatic treatment and kept under observation for 6 to 12 weeks. Those who were not relieved of their symptoms during that period were submitted to a thorough examination, clinical, bacteriological, etc. Of the 122 patients, 27 were relieved of their symptoms and were not seen again. Of the remainder, 30 developed typical lesions of leprosy, and 65 continued to be kept under observation.

The 122 patients suffered from one or other of the following signs or symptoms: pain in a limb (62), burning sensation in the limbs (12), weakness in the limbs (16), progressive loss of weight with anorexia and anaemia (8), repeated traumatic lesions (11), eczema of long duration (11), epistaxis (2). Illustrative cases are detailed under each of these symptoms. "It is a matter of great importance particularly in [an] endemic area [to observe such premonitory symptoms], because early detection and isolation of patients and their treatment is an ideal public health measure." *Ernest Muir*

BOSE, D. N. **Tetanus in Leprosy Patients.** *Leprosy in India.* 1958, July, v. 30, No. 3, 154–5.

Report of a case.

JOB, C. K. **Treatment of Lepra Reaction with Chloroquine.** *J. Christian Med. Ass. India.* 1960, May, v. 35, No. 3, 184–90, 2 charts.

Antimalarial drugs have been found effective in the treatment of lupus erythematosus and rheumatoid arthritis in a way similar to corticosteroids; the

latter are useful in controlling lepra reaction ; might not antimalarial drugs be useful in controlling lepra reaction? This reasoning, along with the results in a leprosy colony in Nigeria where 500 leprosy patients were given pyrimethamine as a malaria prophylactic resulting in reduced lepra reaction [this *Bulletin*, 1959, v. 56, 120], led the author to choose chloroquine for this purpose (lepra reaction control) as it has been shown to be one of the least toxic of antimalarials.

He chose 96 patients with lepra reaction and treated them with chloroquine base, 150 mgm., 3 times daily for the first week, twice daily for the second week and once daily thereafter. Of the 96 patients, 75 showed complete resolution, 6 gave a fair amount of response, and 15 showed no response. 3 illustrative cases are described in detail.

There were no serious toxic symptoms even when the treatment was prolonged up to 12 months. The results compare favourably with those of antimony and mercurochrome, and have the additional advantage that the patient has not to be confined to hospital. It is therefore valuable for use in out-patient clinics, and when given in lower doses over a long period of time " provides a safe and valuable form of treatment for chronic lepra reactions which may constitute such a troublesome therapeutic problem ".

Ernest Muir

MUKERJEE, N., BASU, S. P., SEN, N. R. & KUNDU, S. **Effect of Roentgen Rays on Leprous Nodules of Lepromatous Cases.** *Leprosy in India.* 1959, July, v. 31, No. 3, 81–4. [10 refs.]

12 patients were chosen with lepromatous nodules occurring bilaterally and symmetrically in different parts of the body. 2 of them had irradiation (100 KVP ; 1 mm. aluminium ; 25 cm. distance) on both sides of the body ; the others were irradiated only on one side, the other side being kept as a control.

There was practically no clinical or bacteriological improvement.

It is acknowledged that it is not known whether there is a degree of irradiation which will kill or damage leprosy bacilli without damaging body cells, and that the present patients should be followed up to see if there is any delayed effect.

Ernest Muir

PRICE, E. W. **Studies on Plantar Ulceration in Leprosy. VI. The Management of Plantar Ulcers.** *Leprosy Review.* 1960, July, v. 31, No. 3, 159–71, 5 figs. [10 refs.]

This is the last of a series of 6 studies [see, for example, this *Bulletin*, 1959, v. 56, 1143 ; 1960, v. 57, 139] and deals with the management of the pre-ulcerative stage, plantar ulceration, and healed ulceration.

To prevent ulceration there should be regular and systematic examination of patients' feet, with records kept of anaesthesia, plantar damage, loss of skin and deep tissues, and X-ray examination. The frequency of examinations is in direct proportion to the degree of damage or anaesthesia.

In the management of ulcers it is important to remember that " the healing of a large ulcer by scarring will not support the strain of walking in the best

feet". Antibiotics can speed healing, but "the best encouragement of healing is the application of a walking plaster after infection and oedema are controlled". This and a standard rigid sole sandal are illustrated and described in the appendix. Management of skin loss must be made good by plastic surgery; "it is not adequate (except in minimal cases) if cover consists of scar tissue with an epithelial or Thiersch-graft surface".

In the management of healed ulceration the healing must be considered as only a stage in the treatment. In Africa the author recommends the use of wooden soles with a sponge rubber insole. Rigid sole footwear is indicated both for threatened and for healed plantar ulceration.

The author surmises that as long as anaesthesia persists it may be necessary to wear special footwear, perhaps permanently; but he is confident that odour and hospitalization can be averted by the methods he advises. *Ernest Muir*

IYENGAR, S. G. S. **Trial of Chloromycetin Cream in the Treatment of Trophic Ulcers.** *Leprosy in India.* 1959, Apr., v. 31, No. 2, 51–3.

Ulcers in 22 leprosy patients, 20 of them lepromatous type, were treated with applications of Chloromycetin [chloramphenicol] cream, after having been soaked in saturated magnesium sulphate solution for 15 minutes on the first 3 days, and bony sequestra having been removed when present. "Ulcers which were not healing with the other types of treatment even after a year, healed up completely with the application of Chloromycetin cream within an average period of 48 days." *Ernest Muir*

LE KHAC QUYEN, BUU-HOI, N. P. & XUONG, N. D. Résultats d'un traitement antilépreux pilote par le 4,4′-diéthoxythiocarbanilide dans un hôpital du Sud-Vietnam. [**The Results of a Pilot Test in the Treatment of Leprosy with 4,4′-diethyloxythiocarbanilide in a South Vietnam Hospital**] *Bull. Acad. Nat. Med.* 1960, v. 144, Nos. 23/24, 535–8.

In 1957 the authors reported results of 500 patients treated with 4,4′-diethyloxythiocarbanilide (Dialide) [see this *Bulletin*, 1957, v. 54, 832]. They chose this form of thiourea in preference to 3 others because of its comparative simplicity and lower price. In their earlier trials they had used a daily dosage of 100 mgm., but they later found that they could raise the dose to 400 or 600 mgm. safely and get better results. The good results appeared after some 6 months, but in some cases bacilli tended to reappear. 4 patients are described in detail: 166 patients were treated in all. The lack of permanence, it is suggested, may be due to the development of resistant forms of mycobacteria. *Ernest Muir*

RHODES-JONES, R. **Preliminary Report on the Rapid Fading of *M. leprae* in Sections from Patients treated with Diethyl Dithiol*iso*phthalate.** *Leprosy Review.* 1960, July, v. 31, No. 3, 200.

The author found that in biopsies taken from patients treated with diethyldithiol*iso*phthalate (Etisul) sections with deeply stained acid-fast bacilli

tended to fade, so that 24 hours later no bacilli could be found. When restained the bacilli reappeared but again similarly disappeared. Biopsies from patients treated with other drugs did not show the same result, the bacilli retaining their acid-fastness. Even in a patient who had been treated with Etisul for only 4 days the same disappearance occurred. Smears on slides taken from the same patients treated with Etisul did not fade. Further investigations are being carried out. *Ernest Muir*

HAUZEUR, A. C. Vers l'éradication de la lèpre? Influence du traitement ambulatoire de la lèpre, à la D.A.D.P.S., sur la progression de l'endémie lépreuse et ses résultats (1953–1959). Note additonnelle concernant les rapports existant entre la lèpre et l'allergie à la tuberculine et la valeur prophylactique du B.C.G. [**Towards Eradication of Leprosy? The Influence of Ambulatory Treatment of Leprosy with DDS on the Course of Endemic Leprosy and its Results (1953 to 1959). An Additional Note concerning Affinity between Leprosy and Allergy to Tuberculin and the Prophylactic Effect of BCG**] *Ann. Soc. Belge de Méd. Trop.* 1960, Feb. 29, v. 40, No. 1, 115–67.

This is a report on the effects of compulsory mass treatment of leprosy in the Bosobolo Territory of the north-western Congo with an area of about 13,000 square kilometres and a population of about 70,000. Mass treatment with injections of a 25% suspension of DDS in the ethyl esters of chaulmoogra oil, on a compulsory basis, was first introduced in 1953 and 1954. Although the number of known leprosy patients continued to increase from 39·8 per 1,000 in 1954 to 43·6 per 1,000 in 1959, the number of new infections which had gradually increased up to 11·07 per 1,000 in 1954 gradually decreased from that year to 1·15 per 1,000 in 1958. Isolation of multibacillary lepromatous cases (forming about 2·71% of all patients) accompanied the introduction of mass treatment, but only in some sectors. Previous to this, isolation had been practised for years but without any effect on endemicity. It is considered that mass treatment at intervals of 2 weeks is definitely bringing leprosy under control.

The duration of treatment was for less than 2 years in 17·85% of patients, from 2 to 3 years in 68·79%, and over 3 years in 13·36%, including relapsed patients.

A survey of the Mantoux reaction showed no difference between healthy people and those with leprosy, or in whom leprosy was developing.

Intradermal injection of BCG was not considered to have enough effect on the index of new cases of leprosy to make it worth while. *Ernest Muir*

MCFADZEAN, J. A. & SINGH, R. B. **The Initiation of a Trial of BCG Vaccine for Leprosy.** *Leprosy Review.* 1960, July, v. 31, No. 3, 145–58, 4 charts and 1 map.

To test the efficacy of BCG to increase resistance to leprosy an experiment has been staged on a small island off the west coast of Malaya with a

population of 7,369, all Chinese. The trial was restricted to the age-group of 0 to 25 years, and constituted 3,720 persons. The incidence of leprosy among these was found to be 19 per 1,000, with 71 cases of which 69% were "lepromatous or atypical" and 31% tuberculoid. Tuberculin testing of 3,649 persons showed 3,222 to be suitable for BCG inoculation. 1,648 received injections of freeze-dried BCG vaccine, the remaining 1,574 being kept as controls. Randomization was arranged by choosing for vaccination those born in an odd year up to and including 1957, and those born in an odd month subsequently.

The conversion rates to 5 mm. reactions or over with 2 batches of vaccine were only 79% and 63%, compared with 90% in similar British trials; it is suggested that this may have been due to a drop in the viable counts in the vaccine employed, and that special precautions may be necessary in the tropics in handling BCG vaccine. It is planned to examine the present population of 0 to 25 years of age for leprosy at intervals for the next 10 years. The conditions in this island are considered to be particularly suitable for this trial as the population is static, the people are well-nourished and regularly employed in fishing, the houses are numbered, children have birth certificates and those over 12 have identity cards. *Ernest Muir*

DINIZ, O. Profilaxia da lepra (evolução e aplicação no Brasil). [**The Prophylaxis of Leprosy (its Evolution and Application in Brazil)**] *Bol. Serviço Nac. de Lepra.* Rio de Janeiro. 1960, Mar., v. 19, No. 1, 5–135, 29 figs., 1 graph & 3 maps. [Refs. in footnotes.]

This article, published by the National Department of Health of Brazil, and written by the Director of the Serviço Nacional de Lepra, describes the objects and methods of that body and the results accomplished during the first 3 years of its existence, 1956 to 1958.

Of the 9 chapters the first 4 are of a more general and historical nature dealing with false ideas about leprosy in ancient times, methods of treating leprosy and its victims before the scientific era, the discovery of the bacillus by Hansen, and the 7 international congresses from that in Berlin in 1897 to the last in Tokyo in 1958.

Chapter V (page 35) is devoted to the progress of leprology, and gives an excellent, well-illustrated account of the various types of leprosy, of immunology (including the lepromin test and the effects of BCG), of the practical application of prophylaxis, and of the epidemiology of the disease.

The last 4 chapters deal with leprosy as it is found in Brazil. Chapter VI (page 73) describes first the old-type isolation hospitals (8 in number) opened in Brazil between 1787 and 1883; then the 6 modern leprosaria opened between 1907 and 1929; and lastly the 4 most recent institutions founded between 1930 and 1932. Photographs of 4 of these sanatoria and colonies in the State of Minas Gerais are added. It is noted, however, with sorrow that all these efforts to control leprosy were not sufficient to stop the progress of the disease, as the number of cases per 1,000 rose from 0·96 in 1946 to 1·40 in 1955. It is estimated also that during these 10 years there were 29,572 lepromatous subjects, all carriers of infection.

Chapter VII introduces the new prophylactic orientation adopted in 1956, and introduced by the Serviço Nacional de Lepra. Its object was to extend and intensify sulphone treatment so that it should be carried to patients wherever they might be throughout the country. In planning the campaign there were 3 main objectives: (A) sulphone treatment; (B) the control of contacts with leprous patients, their examination and classification according to the lepromin reaction, and the administration of preventive treatment if necessary; (C) education in the precautions to be taken by patient, contacts, and the public at large. It was planned that the leprosaria should continue and be used for patients who could not be rehabilitated, for those with reactions, those requiring operations or hospitalization for other causes, and for giving courses of training to doctors and others. Dispensaries were to be used as centres for medico-sanitary assistance, for giving instruction and training in leprosy work, for treating a certain number of patients, especially those who could not get treatment elsewhere or who were afraid of ostracism if it was known that they were being treated for leprosy. Preventoria should not be used exclusively for children of leprous parents but also for others with no such connexion, and for training in agriculture and other employments.

Chapter VIII goes into more particular details and statistics. In 1958 there were 19,104 leprosy patients residing in the 36 in-patient institutions in Brazil. There were also 107 special leprosy dispensaries. There were 4,516 children living in 31 preventoria. In the areas of Brazil included in the anti-leprosy campaign for 1958 there were 156,876 registered patients; after deducting 66,978 for various reasons (in institutions, absent, cured, etc.) 44,862 (49·9%) were under supervision and the remaining 45,036 were not under supervision.

Chapter IX deals with the importance of education about leprosy and its prevention. Three types of Courses of Leprology are described: (1) a course for medical students of about 25 hours' duration; (2) an intensive course (25 hours) for doctors who are not specialists in leprosy; (3) a special course lasting 3 months for those who are going to be leprosy specialists.

[This paper is one of considerable practical value and should be studied, if possible, in the original, by those engaged in similar anti-leprosy campaigns.]

Ernest Muir

AZULAY, R. D. & NEVES, R. G. **Sensibilization of Guinea-Pigs after Repeated Lepromin Tests.** *Leprosy in India.* 1959, Apr., v. 31, No. 2, 48–50.

After submitting 15 guineapigs to 5 lepromin tests, the authors found that 11 (73·3%) gave negative reactions, 3 (20%) gave doubtful reactions, and 1 (6·7%) gave a positive reaction. From this it is concluded that repeated lepromin tests are able to sensitize guineapigs to that antigen, but this capacity is very inferior to that of BCG according to previous experience of the authors, so lepromin has a very low antigenic capacity. *Ernest Muir*

HELMINTHIASIS

In this section abstracts are arranged as far as possible in the following order:—TREMATODES (*schistosomes, other flukes*); CESTODES (*Diphyllobothrium, Taenia, Echinococcus, other cestodes*); NEMATODES (*hookworms, Ascaris, filarial worms, Dracunculus, etc., Trichuris, Enterobius, Trichinella, etc.*).

HSÜ, Jih-Kuang, WU, Yi-Sheng. LU, Ch'un-Pin, CH'EN, Ming-Kang & LÜ, Chi-Shun. **Sodium Antimony Dimercaptosuccinate (Sb-58) in Treatment of Schistosomiasis japonica.** *Chinese Med. J.* Peking. 1960, June, v. 80, No. 6, 530–37, 5 figs.

Sb-58 is a trivalent antimonial recently synthesized at the Institute of Materia Medica, Academia Sinica. It is a crystalline hydroscopic substance with an antimony content of 24–27%; soluble in water, it can be given intramuscularly or intravenously. In laboratory animals it proved less toxic than did tartar emetic; its effect on *Schistosoma japonicum* infections in them was greater than that of tartar emetic [the potassium salt].

567 patients (459 males) aged from 3 to 68 years, all with *S. japonicum* infections, were treated with a 10% aqueous solution of Sb-58 given intramuscularly. There was very little transient local irritation after each injection; systemic reactions were gastro-intestinal disturbances (anorexia; nausea and vomiting; abdominal discomfort and diarrhoea), dizziness and headaches, and fever. Occasionally there were rashes and joint pains; there was no coughing. The severity of the side effects was in proportion to the dosage of the drug. 145 (65·3%) of 222 patients on a 12-day regime completed the course of treatment prescribed; 56 (25·2%) finished it after modification of the dosage owing to the side effects it produced; 21 (9·5%) had to stop taking the drug for the same reason; 3 died as a result of the drug, and another died from bleeding from oesophageal varices. 55 control patients with similar disease were treated with antimony potassium tartrate for the purpose of comparison, a 3-day treatment with 12 mgm./kgm. of this drug being given.

The courses of treatment were either short (3 days) or long (12 days). In the 3-day course the dosage was 35–40 mgm./kgm. or 30–35 mgm./kgm., the former of these two being given to children with latent schistosomiasis. In the 12-day course it was 40 mgm./kgm., 45–50 mgm./kgm. or 60 mgm./kgm., the last being used for children with advanced disease. In addition to routine examinations of the blood and urine, and of liver function, assessments were made of the absorption, distribution and excretion of the drug; serial electrocardiograms [ECG] were also done. These studies indicated that the absorption of Sb-58 after intramuscular injection is satisfactory, and that the resultant blood concentration of antimony is higher than that obtained with antimony potassium tartrate and is proportional to the dosage. ECG changes are similar with either drug. There was no evidence of disturbances of liver function attending treatment with Sb-58.

The relapses among 51 patients treated with antimony potassium tartrate and watched for 1–2 months were 29 (56·7%); those among 206 patients treated for 3 days with Sb-58 and watched for 2–3 months were 74 (35·9%); those among 108 patients treated for 12 days and watched for 2–3 months were 18 (22·2%). Over 3–6 months' observation of 114 patients treated for the 3-day period the relapse rate was 42·1%, and of 93 treated with the 12-day

course it was 35·5%. Sb-58 therefore seems to be of promise for the treatment of schistosomiasis on a large scale. The regime recommended for early cases is the 3-day course, with 30–35 mgm./kgm., and for advanced cases the 12-day course with 45–50 mgm./kgm. As children under 16 years have a higher tolerance, it is suggested that about 5 mgm./kgm. should be added to each of the regimes. *A. R. D. Adams*

OSHIMA, T.; YOSHIDA, Y.; KIHATA, M. [**Studies on the Excystation of the Metacercariae of** *Paragonimus westermani*. **1. Especially on the Effect of Bile Salts**] [OSHIMA, YOSHIDA & KIHATA]. *Bull. Inst. Pub. Health.* Tokyo. 1958, Dec., v. 7, No. 4, 256–69, 14 figs. [26 refs.] [**2. Influence of Pepsin Pretreatment on the Effect of Bile Salts**] [OSHIMA & KIHATA]. *Ibid.*, 270–74, 4 figs. [In Japanese.]

The English summaries appended to the papers are as follows:—

1. "Excystation of the metacercariae of *Paragonimus westermani* was observed in various physical and chemical conditions of environments *in vitro*. The most effective temperature to induce excystation was 40°C., effective *p*H range 6·5–8·0, and favorable osmotic pressure of environment $\angle\!| = -0{\cdot}40$°C. The excystation never occurred in the environments of high osmotic pressure (over $\angle\!| = -1{\cdot}0$°C.), low *p*H degree (below *p*H 6·0) and low temperature (below 30°C.). Even in this most favourable condition of *p*H, temperature and osmotic pressure it took 3 hours to induce 50% excystation, but if 0·5% of bile salts (sodium cholate or sodium desoxycholate) was added it occurred in 100% within 30 minutes. Bile salts were the most effective agents to induce excystation of the metacercariae of *Paragonimus westermani*.

2. "The excystation of metacercariae of *Paragonimus westermani* was induced within 10 minutes by bile salts when pretreated with artificial gastric juice. But the effect of gastric juice was neither due to pepsin nor to acidic condition, but to its low osmotic pressure and temperature. Synergetic effect of bile salts and trypsin could not be observed. Consequently the protolytic enzymes had nothing to do with the excystation."

TSUZI, Y. *et al.* [**Two Cases of Paragonimiasis Cerebri**] *Endemic Dis. Bull. Nagasaki Univ.* 1960, Mar. 23, v. 2, No. 1, 46–52, 8 figs. [19 refs.] [In Japanese.]

The English summary appended to the paper is as follows:—

"Up to date about 30 surgical cases of paragonimiasis cerebri had been reported in this country. Recently 2 cases of this disease were successfully surgically treated in our Surgical Department. The first case was relative to a 18-year-old boy who complained of convulsive seizures, left hemiplegia and loss of vision. The second case was concerning a 19-year-old boy with headache, left hemiplegia and impediment in speech.

"In both cases calcific densities were observed on the plain craniograms, and the cerebral angiograms revealed a figure of displacement suggesting the presence of intracranial masses. Although routine physical examination of the chest gave no particular findings, the X-ray films suggested an infiltrative

lesion of the lungs due to lung flukes. There were no parasite eggs in the sputum and feces to be seen. Eosinophilia in the peripheral blood and spinal fluid was not observed. The Wassermann reaction of the blood and spinal fluid was negative but in the mastic test with the spinal fluid a reaction showing a type of progressive paralysis was observed. In the second case the intradermal test with a *Paragonimus westermanii* antigen was tried with a positive reaction, by which a sure diagnosis was made ante operationem. In the first case the test was not executed."

ABURAYA, T., MIYAGAWA, M. & TANAKA, S. **An Experimental Study on the Treatment of Pulmonary Distomiasis.** *Tokushima J. Exper. Med.* 1959, Nov., v. 6, No. 3, 253–9.

Paragonimus infection of the lungs is widely treated in Japan with emetine and sulphonamides but the results are often unsatisfactory. Accordingly the authors carried out experiments with dogs experimentally infected with *P. westermani* and passing ova in the faeces. After treatment the dogs were killed and the worms were examined post mortem. The dogs were considered "cured" if no live worms could be found and "partially cured" when only half the cysts contained worms. 6 dogs were treated for 14 days with emetine alone or with emetine plus Irgafen (N–3, 4-dimethylbenzoylsulphanilamide). The therapeutic effect was slight and Irgafen made no difference. 4 other dogs were treated for 4 periods each of 10 days. With emetine and Irgafen, one dog was wholly cured and one dog partially cured; with emetine alone both were partially cured. Emetine plus Acrinol (ethoxydiamino acridine) [this *Bulletin*, 1954, v. 51, 612] was toxic (given for 4×10 days). Emetine and aluminium hydroxide gel was similar to emetine plus Irgafen (2 dogs); emetine plus Digesan (kainin acid and santonin) partially cured 1 dog, just as emetine alone did (2 dogs).

[All these results are obtained on 1 or 2 dogs, and hence the differences are hardly significant.]

4 rabbits were treated with emetine HCl, 7 consecutive daily injections of 2 mgm./kgm. and were killed 1 hour after the last injection. The average concentration of emetine in the tissues was as follows: spleen 195 mgm./kgm.; liver 94; kidney 117; lung 165; heart 21; large intestine 6·3; muscle 4·8. In 4 rabbits treated similarly with emetine plus Irgafen, the average concentration of emetine in the tissues was 60–100% higher. The tissue concentration of emetine was also raised by aluminium hydroxide gel but not by Neutran (aluminium magnesium silicate). It is concluded that the treatment of paragonimiasis with emetine requires to be repeated over long periods and that supplementation with Irgafen is an advantage, probably because it increases the concentration of emetine in the tissues. *F. Hawking*

CUADRA, M., CHIAPPE C., J. & CARCELEN B., A. Las formas febriles agudas de la fasciolosis hepática. (Biopsia de higalo en un caso.) [**Acute Febrile Forms of** *Fasciola hepatica* **Infection**] *G.E.N.* Caracas. 1960, Jan.–Mar., v. 14, No. 3, 293–305, 4 figs. & 2 graphs. [24 refs.]

An account of 2 cases in Venezuela and a review of the literature.

ARH, I. **Fish Tapeworm in Eskimos in the Port Harrison Area, Canada.** *Canadian J. Pub. Health.* 1960, July, v. 51, No. 7, 268–71.

"A survey of camps at Port Harrison, province of Quebec, showed a fish tapeworm incidence of 77%. Upon exclusion of breast fed babies, the incidence was 83%.

"The theory is presented that the fish tapeworm has always been part of the North American parasitic group."

[See this *Bulletin*, 1949, v. 46, 376; 1951, v. 48, 475.]

KAIPAINEN, W. J. & VUORINEN, Y. V. **ABO Blood Groups in Pernicious Anaemia and Pernicious Tapeworm Anaemia.** *Ann. Med. Exper. et Biol. Fenniae.* Helsinki. 1960, v. 38, No. 2, 212–13.

"The distribution of ABO groups in 138 cases of pernicious anaemia and 197 cases of tapeworm anaemia in Finland was studied. In agreement with the picture given by previous investigations, the A/O ratio was greater in pernicious anaemia than in the control series. It was particularly noteworthy that this ratio was even greater in pernicious tapeworm anaemia."

NYBERG, W. **The Influence of *Diphyllobothrium latum* on the Vitamin B_{12}-Intrinsic Factor Complex. I. *In vivo* Studies with Schilling Test Technique.** *Acta Med. Scandinavica.* 1960, July 1, v. 167, No. 3, 185–7. **II. *In vitro* Studies.** *Ibid.*, 189–92.

By demonstration of radioactive B12 and measurement of its urinary excretion the efficiency of absorption was tested in 10 healthy persons and 7 patients with pernicious anaemia. When both groups were also treated with intrinsic factor their urinary excretion of vitamin B12 rose significantly. The same tests were performed on 10 carriers of *Diphyllobothrium latum* with, and on 15 carriers without, tapeworm anaemia. There was little effect of intrinsic factor on the absorption of vitamin B12 in the worm carriers and the conclusion was drawn that a tapeworm blocks the effect of intrinsic factor.

In *in vitro* experiments both human gastric juice and intrinsic factor from hog's stomach were incubated with radioactive vitamin B12 in the presence and in the absence of the tapeworm. It was possible to demonstrate that the worm lowers the vitamin binding capacity of the intrinsic factor and can also split the complex formed between vitamin B12 and the intrinsic factor. The method of demonstrating this was to record the radioactivity taken up by the worm and it could be shown that the radioactive B12 found in the worm was almost entirely in a non-dialysable form. *H. Lehmann*

MÄRKKANEN, T. K., KALLIOMÄKI, J. L., OKA, M., MUSTAKALLIO, E. & BRUMMER, P. **Urinary Excretion of Thiamine, Riboflavin, Nicotinic Acid, Pantothenic Acid and Biotine in Anemic and Non-Anemic Carriers of the Fish Tapeworm (*Diphyllobothrium latum*).** *Ann. Med. Exper. et Biol. Fenniae.* Helsinki. 1960, v. 38, No. 2, 133–9. [13 refs.]

It is now established that the watery extract of *Diphyllobothrium latum* contains a large amount of vitamin B12, an average of 2·3 μgm. per gm. dry worm substance. The corresponding values for *Taenia saginata* and *Ascaris lumbricoides* are 0·046 and 1·8 μgm. vitamin B12 respectively. The high avidity of the worm for vitamin B12 forms the basis of the test in which a single dose of vitamin B12 containing radioactive cobalt (^{60}Co) is given to a worm carrier: when afterwards the urine is tested for radioactivity little of it is found, but on examination of the worm it can be demonstrated that most of the radioactivity is concentrated in the proximal part of the parasite.

In the present work similar tests on normal people (7) and worm carriers, both anaemic (8) and non-anaemic (20), were made with thiamine, riboflavine, nicotinic acid, pantothenic acid and biotin. There was no difference between the normal people and the worm carriers as far as the urinary excretion of riboflavine, nicotinic acid and biotin was concerned. There was a significantly lower excretion of pantothenic acid when the anaemic patients were compared with non-anaemic worm carriers, but there was no such difference between these non-anaemic worm carriers and healthy controls.

The most impressive results were obtained with thiamine where the urinary excretion was significantly lower in the anaemic patients than in the non-anaemic worm carriers and again significantly lower in these non-anaemic worm carriers than in the healthy controls. After successful treatment the urinary thiamine excretion rose to normal in all groups. *H. Lehmann*

FROYD, G. **Cysticercosis and Hydatid Disease of Cattle in Kenya.** *J. Parasitology*. 1960, Aug., v. 46, No. 4, 491–6. [27 refs.]

WERTHEIM, Guta, ZELEDON, R. & READ, C. P. **Transaminases of Tapeworms.** *J. Parasitology*. 1960, Aug., v. 46, No. 4, 497–9. [10 refs.]

DONCKASTER, R., GODOY, M. & MORALES, Inés. Tratamiento de la teniasis por intubación duodenal: a) con solución hipertónica de sulfato de magnesia y b) con acridínico en solución isotónica. [**Treatment of Taeniasis by Duodenal Intubation: (a) with Hypertonic Solutions of Magnesium Sulphate; (b) with Isotonic Solution of Acridine**] *Bol. Chileno de Parasit.* 1960, Apr.–June, v. 15, No. 2, 29–31.

The English summary appended to the paper is as follows:—

"1.—Five cases of teniasis (*Taenia saginata*) treated by duodenal intubation with glycerol, saturated magnesium sulphate, and saline, at 60°C., early developed the 'Dumping syndrome' during treatment. Only one patient was cured from the gastroenterological standpoint. This therapeutic procedure appears to involve some risks for the patient, and had to be discarded.

"2.—On the other hand, none of 14 cases of teniasis (3 cases of *Taenia solium* and 11 of *Taenia saginata*) showed any sign of intolerance when treated by duodenal intubation with acridines in isotonic solution. All patients were parasitologically cured, the parasite being completely eliminated in 11 cases. This type of therapy is recommended when the normal 'per os' procedures have failed."

BROOKS, T. J., Jr., HUTCHINSON, W. F., SAFLEY, T. J. & ROSS, T. G. **Human Sparganosis in Mississippi: Report of Two Cases.** *Amer. J. Trop. Med. & Hyg.* 1960, Mar., v. 9, No. 2, 192–4, 2 figs. [10 refs.]

The authors summarize the literature on the discovery and incidence of sparganosis in man in North and South America and record 2 more cases from North America.

The first of these was a white female, who had had, for 6 months, a firm painless "mass" measuring 2·5 × 1·5 cm. and attached to the skin in the right outer quadrant of the right breast. It had first appeared several years earlier on the right arm and had appeared and disappeared there until it had finally moved to the breast. The patient had travelled extensively, but never outside the United States. The larva found in it after its surgical removal was identified as a sparganum, possibly that of *Spirometra mansonoides*.

The second patient was a housewife who had had, for 3 to 4 months, a small, painless nodule on the right anterior chest. She had not been outside Mississippi State, except for a visit to Alabama, and she denied the use of meat poultices. The nodule, about 1 cm. in diameter, was situated about 5 cm. below the lower border of the right breast and was freely movable. It was found, after surgical removal, to consist of several masses of fibrous tissue infiltrated with fat, in which there was a sparganum, fragments and transverse sections of which are shown in photographs. The authors considered that this was the sparganum of *Spirometra*.

They were, however, unable to feed either of the spargana here described to a suitable final host, so that they cannot state that they were, in fact, spargana of *Spirometra* (*Diphyllobothrium*) *mansonoides*.

Nevertheless, they quote literature which records the occurrence of *S.* (*D.*) *mansonoides* in the bobcat (*Lynx rufus*) in North Carolina and Florida and in the house cat in New York and Louisiana and, during their own study of the incidence of *Echinococcus granulosus* in Mississippi State, they found adult tapeworms, identified by Dr. J. F. MUELLER as *Spirometra mansonoides*, in 7 bobcats trapped in that State. Because bobcats occur in the area in which the spargana here described were found, the authors think there is presumptive evidence that these spargana were, in fact, larvae of *Spirometra mansonoides*.

G. Lapage

JONATHAN, O. M. **Hydatid Disease in North Wales.** *Brit. Med. J.* 1960, Apr. 23, 1246–53, 6 figs. [10 refs.]

The surgical aspects of hydatid disease as occurring in recent years in North Wales are described. 144 patients with the infection were admitted to hospital in the whole of Wales from 1927 to 1936, mostly from the industrial areas of Glamorgan and Monmouth. 34 additional patients were treated in Cardiff Royal Infirmary between 1926 and 1938. 44 patients were treated in hospitals in North Wales from January 1948 to December 1957, most of them from the industrial areas of Flintshire and Denbighshire and the heavily populated area of the North Wales coast, where 4% of the sheep slaughtered in the abattoirs of the Wrexham rural district are infected with liver hydatid disease.

13 of those treated suffered from pulmonary infections, 6 of them being under 30 years of age. In 3 of the 44, primary cysts of the spleen occurred.

34 patients were operated upon but in the remaining 10 the diagnosis of hydatid disease was supported by radiological, serological and haematological investigations. 6 of these 10 had few symptoms and were bad operative risks, 3 refused treatment and in one of them the diagnosis was made at post-mortem examination. A correct pre-operative diagnosis was made in 21 of the 34 subjects treated surgically.

One-stage operations were done on all patients, 3 techniques being employed: (1) excision of the entire cyst including the adventitia, (2) excision of the parasitic membranes and conversion of the cavity into a saline cyst, or (3) excision of the parasitic membranes followed by open tube drainage or marsupialization of the residual cavity.

4 patients died, all over 60 years of age and suffering from complicated multivesicular cysts. *W. E. Kershaw*

ARSLANOVA, A. K. [**Alveolar Echinococcosis in the South Part of Kazakhstan**] *Med. Parasit. & Parasitic Dis.* Moscow. 1960, v. 29, No. 3, 349–50. [In Russian.]

The English summary appended to the paper is as follows:—

"The data furnished by the dissecting departments of the Alma-Ata city clinical hospital and those of the Southern-Kazakhstan, Dzhambul and Taldy-Kurgan regions were taken as a basis for the study of the alveolar echinococcosis spread among the population of southern Kazakhstan, largely, for a period covering 1941–1957.

"Altogether 19,837 records of autopsy finding were examined and a total of 99 echinococcosis cases revealed (0·49%), of which 33 (33·3%) belonged to the alveolar type. In the post-war years the incidence of alveolar echinococcosis registered at autopsies in Alma-Ata showed a decline by nearly 4 times. Intravital diagnosis of alveolar echinococcosis is made only in 48·7% of the cases."

VOGEL, H. Tiere als natürliche Wirte des *Echinococcus multilocularis* in Europa. [**Animals as Natural Reservoir Hosts of** *Echinococcus multilocularis* **in Europe**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1960, v. 11, No. 1, 36–42. [11 refs.]

In 1955 and 1957 Vogel discovered the existence of *Echinococcus multilocularis* in animals in southern Germany. This parasite has been proved to be present in escaped specimens of the nutria or coypu (*Myocastor coypus*). Since that time he has examined 991 small animals, mostly rodents, for the most part from Swabia (Württemberg) 700–1,000 metres above sea level. Some came from upper Bavaria and others from Canton Thurgau in north Switzerland. Out of 11 species *Microtus arvalis* (field vole) and *Vulpes vulpes* (fox) were proved infected. The latter (8 in number) harboured the tapeworm stage of *E. multilocularis*. The author thinks the normal cycle in the field is fox—field-mouse—fox, and in the house cat—house-mouse—cat.

Philip Manson-Bahr

HEWITSON, R. P. & CASSERLEY, R. D. **Mediastinal Hydatid Cysts.** *South African Med. J.* 1960, July 23, v. 34, No. 30, 629–32, 6 figs.

"Seven cases of hydatid disease of the mediastinum are reported, seen in recent years at the thoracic surgical unit of Groote Schuur Hospital. One intrapericardial cyst is included.

"The possible route of infection and rate of growth are discussed and some of the literature referred to."

ESTABLE PUIG, J. F., FERRERO DE ESTABLE, R. & FOLLE, J. A. Estudio experimental de la embolización cerebral de fragmentos microscópicos de quitinosa hidática. [**Experimental Study of Cerebral Embolization of Microscopic Particles of Hydatid Chitin**] *An. Facul. de Med. Montevideo.* 1960, v. 45, No. 1, 27–34, 11 figs. [23 refs.]

The English summary appended to the paper is as follows:—

"1. A description is made of the preliminary results of the application to the central nervous system of guineapig and rabbit, of an experimental technique for the study of the obliteration of the parenchymal vascular network based on the embolization of microscopic fragments of hydatid chitin.

"2. The most constant alterations of behaviour were: homolateral inclination of head, contralateral pleurothotonos and hemiparesis, counter clockwise turning movements and convulsions.

"3. The distribution emboli, as well as their number, was variable but with homolateral cerebral prevalence, anterior and superficial (meningeal and cortical).

"4. Proved anatomopathological alterations consisted of: homolateral edema and congestion in every single case and in some instances, focal lesions, mostly of the anemic infarction type and more rarely, small hemorrhagic lesions."

SAGNET, H. & DEMÉ, J. Essai de traitement de l'ankylostomose par l'hydroxynaphtoate de béphénium. Rapport préliminaire à propos de 70 observations à Brazzaville. [**Treatment of Ankylostomiasis with Bephenium Hydroxy-naphthoate; Preliminary Report on 70 Cases in Brazzaville**] *Med. Trop.* Marseilles. 1960, May–June, v. 20, No. 3, 362–4.

The drug, bephenium hydroxynaphthoate (Alcopar, Burroughs Wellcome & Co.), was tested in view of the favourable reports from veterinary practice; absorption was known to be slight. The results of the treatment on adults and children, about which the authors furnished details, were very favourable and they suggest the following dosages:—

for adults: 5 gm. in one sachet;
for children over 2 years old: 5 gm. as above;
for children under 2 years: 2·5 gm. or half a sachet.

The general outcome of this treatment is much superior to that of tetrachlorethylene, and moreover it is an active ascaricide, and complete

elimination of *Ascaris* was obtained in 70%. Even in children less than 2 years of age it is innocuous and there are no side effects.

Philip Manson-Bahr

KOMIYA, Y., KOBAYASHI, A., KUTSUMI, H., KOJIMA, K., KUMADA, M. & OGAWA, H. [**On the Mass Treatment of Hookworm Infection. 4. The Comparative Study of the Anthelmintic Effect of 4-Iodo-Thymol and 1-Bromo Naphthol (2) Preparation**] *Japanese J. Parasit.* 1960, Apr., v. 9, No. 2, 195–8. [In Japanese.]

The English summary appended to the paper is as follows:—

"1-bromo naphtol (2) has been proved to be markedly effective for hookworm infection. It was produced in Japan and now is sold under the trade name 'Wormin' and is widely used as an adequate preparation for the purpose of mass treatment. No purgative is necessary for its administration because of its rareness of the side effect. Recently a preparation of 4-iodo-thymol has been produced in Japan under the trade name of 'Tymolan' as an anthelmintic for hookworm also without purge.

"Here the anthelmintic effect of the latter chemical and its side effect was tested along with the former application. One half of students of the middle school harboring hookworm ova were administered with 4-iodo-thymol and the other half with 1-bromo naphtol (2), and the results proved that both chemicals were almost equally effective for the expelling of the hookworm and their side effects equally slight. Thus the 4-iodo-thymol preparation can be used for the mass treatment of hookworm infection without purge."

DAO L., L. Complicaciones apendiculares y oclusivas de la ascaridiosis intestinal. [**Appendicitis and Intestinal Obstruction as complications of Ascariasis**] *G.E.N.* Caracas. 1960, Jan.–Mar., v. 14, No. 3, 245–53, 2 figs. [13 refs.]

The English summary appended to the paper is as follows:—

"Four cases of acute appendicitis and eight cases of intestinal obstructions due to *Ascaris lumbricoides* are presented in this paper.

"Revision of the appendix after appendectomy was performed showed *Ascaris lumbricoides* blocking the lumen of the appendix.

"Three cases of intestinal obstruction due to ascarides were treated with ileostomy. After removal of the obstructive block of ascarides, ileostomy was closed with the usual surgical technique.

"Of the other five cases of intestinal obstruction, three cases were treated orally with Diethylcarbamazine (Lederle) and two cases with piperazine.

"All cases responded successfully to the treatment."

BIAGI F., F. & RODRIGUEZ, O. **A Study of Ascariasis Eradication by Repeated Mass Treatment.** *Amer. J. Trop. Med. & Hyg.* 1960, May, v. 9, No. 3, 274–6. [11 refs.]

Piperazine has been used with success in single-dose mass treatments of ascariasis [this *Bulletin*, 1957, v. 54, 325]. The present authors point out that

if such treatment repeated during 30 days should destroy recently-acquired *Ascaris* before they reached maturity, infective eggs would disappear from the soil in due course and the biological cycle of the worm would be broken. There would, of course, remain the possibility of new infections from pigs, residual infections and re-infections from outside the controlled area.

They have studied these possibilities in Astapa, a small village in the State of Tabasco in Mexico, a tropical region where the 529 inhabitants live in 89 houses in conditions of poor hygiene. Defaecation on the soil is common and pigs are present in most households, though it appears that these animals rarely harbour worms.

Local collaboration was enthusiastic and all but 6 of the residents participated in the programme. Each person was given treatment every month for 8 months with piperazine hexahydrate in a single dose of 100 mgm./kgm. to a maximum total of 4 gm. per single dose. This was given in the form of a syrup containing 10 gm. piperazine hexahydrate and 200 mgm. of Superinone (a surfactant) per 100 ml. (Bryrel with Superinone, Winthrop Products). For various reasons 5 to 8% of the people missed taking the drug on each occasion. No other measures were undertaken.

The results are shown in 2 tables. After the first treatment 115 (28·3%) persons passed *Ascaris*. 519 *Ascaris* were expelled and this was reduced to 219 after the second treatment and of these only 14 were mature worms. The tables show that the number of persons expelling worms and the number of worms expelled diminished each month: also the proportion of immature worms increased with time, so that the number of mature worms—and hence the infectivity—was rapidly reduced after the first treatment. By the fourth treatment, only 3% of persons passed worms, numbering 43, of which only 21 were mature. After the sixth treatment, no mature worms remained and after the eighth all the persons were negative. In all, 3,968 individual treatments had been given: there were no untoward side effects.

The authors conclude that human ascariasis may be eradicated by mass treatment in a closed population: but to be lasting, the eradication must be extended simultaneously to adjacent areas. The cost of the disease must be weighed against the costs of eradication in a particular area if such a large scale programme is to be undertaken. *H. J. O'D. Burke-Gaffney*

FUJTA, K. **[Studies on the Ovicidal Effects of Agricultural Chemicals upon the *Ascaris* Eggs. 3. Influences of Temperatures upon the Effectiveness]** *Japanese J. Parasit.* 1960, Apr., v. 9, No. 2, 125–8. [10 refs.] [In Japanese.]

The English summary appended to the paper is as follows:—

"It was reported in the two previous papers that among a number of agricultural chemicals, chlorthion, isochlorthion, D.D.T., pentachlorophenol, sappiran, koromite and crezol were found effective in destroying ascaris eggs. Those experiments were carried out at the temperature of 28°C. It is, however, generally true that the ovicidal effect of chemicals increases at higher temperature and decreases at lower temperature. In this paper, the effects of those chemicals mentioned above were compared at lower (5°C.), middle (17°C.) and higher (33°C.) temperatures.

"The methods of experiments were the same as those stated in former reports. Eggs collected from swine ascaris uteri were immersed in 1:1000 solutions of those chemicals to be tested for 7, 12 and 17 days. After these periods, eggs were washed off the chemicals and kept in 28°C. incubator. The effect of the chemicals was evaluated by the percentages of eggs degenerated after 50 days' incubation. The living eggs became all embryonated during this period.

"As was expected, the lower the temperature, the smaller were percentages of degenerated eggs. These influences of temperatures upon the effectiveness, however, were not in the same degree in all chemicals tested. D.D.T., sappiran and crezol showed large differences, chlorthion and pentachlorophenol showed less differences and isochlorthion showed little differences in the effectiveness at the lower and higher temperatures. The effectiveness of the isochlorthion, as indicated by the percentage of degenerated eggs was 93% at 5°C., 91% at 17°C., 81% at 28°C. and 100% at 33°C. This chemical looks like the most promising in destroying helminth eggs in nightsoil."

WYSOCKI, E. & NASIŁOWSKA, Maria. Oporność jaj *Ascaris lumbricoides* na działanie środków okdażających z grupy hydrosykwasów aromatycznych. [**Resistance of** *Ascaris lumbricoides* **Eggs to the Effect of Antiseptics from the Group of Aromatic Hydroxy Acids**] *Wiadomości Parazytologiczne.* Wroclaw. 1960, v. 6, Nos. 2/3, 185–7.

The English summary appended to the paper is as follows:—

"The effect of antiseptics from the aryl group of aromatic hydroxy acids on *Ascaris lumbricoides* and *A. suum* eggs was investigated by the method of direct contact (at 26°C.). The preparations applied showed no destructive effect on the eggs of the above mentioned worms."

JUNG, R. C. & PACHECO, G. **Use of a Hemagglutination Test in Visceral Larva Migrans.** *Amer. J. Trop. Med. & Hyg.* 1960, Mar., v. 9, No. 2, 185–91. [24 refs.]

A haemagglutination test with tanned sheep erythrocytes and antigens made from *Toxocara canis* and *Ascaris lumbricoides* adults was used to test the sera (i) of people suspected of having visceral larva migrans, (ii) of contacts of these people, (iii) of negative controls, and (iv) of those infected with various intestinal parasites. Those with clinical symptoms attributable to larva migrans usually (79·3%) showed titres for either *Toxocara* or *Ascaris* antibody or both above 1 in 80. Sera from over 90% of negative controls and contacts without signs of visceral larva migrans had low titres (1 in 80 or lower) with both antigens. There was little cross-reaction between sera from patients with hookworm, whipworm and visceral larva migrans, but sera from patients infected with *Strongyloides stercoralis* frequently gave high titres with *Toxocara* antigen (20%) and with *Ascaris* antigen (51·4%). Patients having

intestinal ascariasis but no signs of visceral larva migrans had low titres with *Ascaris* and *Toxocara* antigens. *W. E. Kershaw*

JORDAN, P. **Bancroftian Filariasis in Tanganyika: Observations on Elephantiasis, Microfilarial Density, Genital Filariasis and Microfilaraemia Rates.** *Ann. Trop. Med. & Parasit.* 1960, June, v. 54, No. 2, 132–40, 4 figs. [24 refs.]

This paper analyses more of the data obtained from surveys designed to show the distribution and incidence of *Wuchereria bancrofti* infection in Tanganyika [this *Bulletin,* 1955, v. 52, 467, and 1956, v. 53, 222]. It deals in particular with the relationship between microfilaria rate and microfilarial density [see also *ibid.,* 1955, v. 52, 808] and with the relationship between these and the incidence of genital filariasis.

For purposes of analysis, the results from different villages were combined into five "endemic groups" based on the prevailing microfilaraemia rates in adult males (over 16 years). Microfilarial densities were counted in blood samples, unmeasured but approximately 25 to 30 cmm., taken at 8 p.m., and are expressed as mean microfilaria count per positive blood. Examination for genital filariasis was not always possible, and figures relating to this are restricted to areas where clinical examination and blood findings could be correlated.

At each level of endemicity, the microfilaraemia rate tended to increase with age, this tendency being most pronounced in the group with the highest mean rate. The combined figures for all groups showed the same tendency both in males and females, except for a slight drop in the group aged 66 years and over; mean microfilarial densities for both sexes followed much the same pattern.

Mean values for adult males who could be clinically examined are tabulated and charted for the five endemic groups. The higher the mean microfilaria rate of the group, the higher was the mean microfilarial density per positive blood, and the greater the incidence of genital filariasis. The ratio of genital filariasis rate to microfilaraemia rate, however, was fairly constant.

In discussion, it is pointed out that whereas persons with elephantiasis have a low microfilaraemia rate in areas where the periodic *W. bancrofti* is prevalent, persons with elephantiasis in the Pacific area have a high microfilaraemia rate; this finding may reflect differences in the pathogenesis of elephantiasis. Adult males with hydrocele in Tanganyika were found to have a higher microfilaraemia rate at all ages than those without hydrocele.

[Anyone interested in these aspects of filariasis should consult the original paper. The statistics presented, however, are insufficient for detailed analysis. Thus the numbers constituting the various age-groups in Fig. 1 are not stated, while some at least of the mean microfilarial densities appear to be based on quite small numbers of positive bloods. The significance of the relationship between mean microfilaria rate and the incidence of genital filariasis cannot be estimated because one is left uncertain whether males with hydrocele—who have a higher microfilaria rate than other males—have been included or excluded when calculating the mean microfilaria rate of the various endemic groups.] *T. Wilson*

SOUTH PACIFIC COMMISSION. Noumea, New Caledonia. **Annotated Bibliography of Filariasis and Elephantiasis. Part 5. Prophylaxis and Control of Filariasis due to *Wuchereria bancrofti* and *W. malayi*** [IYENGAR, M. O. T.] *Technical Paper No. 129.* 1960, June, vii + 102 mimeographed pp., 1 map.

See this *Bulletin,* 1960, v. 57, 393.

FUKAMACHI, H. [**Experimental Studies on the Periodicity of Microfilariae. I. Provoking Effect of Stress Stimuli upon the Migration to the Peripheral Circulation of Microfilariae**] *Endemic Dis. Bull. Nagasaki Univ.* 1960, Mar. 23, v. 2, No. 1, 27–38, 15 figs. [55 refs.] [**II. Influence of Prolonged Chlorpromazine Treatment upon the Microfilarial Periodicity**] *Ibid.*, 39–45, 4 figs. [30 refs.] [In Japanese.]

The English summaries appended to the papers are as follows:—

I. "Almost all physiological functions of the body of man and of the higher mammals are used to take a slight fluctuation according to a 24-hour rhythm in normal condition of life, moreover, they can undergo vibrative changes in response to heavy stress stimuli. It has been a purpose of the experiment to inquire into the relation of the microfilarial cycle to these physiological changes of the body. To begin with, some agents which exert influence on the number of circulating microfilariae in dogs have been investigated.

"Results obtained are summarized as follows:

"1) In dogs infected with *Dirofilaria immitis,* a considerable increase in the number of microfilariae in the peripheral circulation in the daytime was found to be caused by application of electroshock (100–110 Volt/1–2 sec.), and cardiazol shock, by subcutaneous injection with acetylcholine (150 mg. to 200 mg.) or pilocarpine (1·0 mg. or 2·0 mg. per kg.), and by intravenous injection with communin (2·0 cc.). Other stimuli such as adrenalin (500 γ), atropine (1 mg. or 2 mg. per kg.), chlorpromazine (75 mg. to 150 mg.), ethylemin and promethazine proved to be not effective on the microfilarial count. Increase in the microfilarial count by those effective stimuli was so dramatic that it amounted to 200–520%, supposing it in natural condition to be 100%, within 5 to 30 minutes, although afterward the parasites began to reduce gradually in number to get back to normal level.

"2) The effect of acetylcholine, supatonin and of electroshock in provoking an increase in the microfilarial count was found to be almost completely prevented in individuals one hour before pretreated with atropine or surgically bilaterally vagectominized.

"Conclusion: It may be likely considered that the microfilarial periodicity is probably due to some of physiological vibrations, especially to a parasympathetic stimulation in the host, because it was experimentally demonstrated that the migration into the peripheral circulation of microfilariae has been undoubtedly provoked by such stress stimuli."

II. "The study was carried out with a view of observing the microfilarial cycle in the altered physical state of the host to whom sympaticomimetic drug

was administered. Two dogs infected with *Dirofilaria immitis* and seven volunteers infected with *Wuchereria bancrofti* were prolongedly treated with chlorpromazine. The drug was given for 11 to 21 days, by daily dose varying 37·5 to 200 mg. in patients and 150 to 200 mg. in dogs, divided in three doses. The number of microfilariae was counted by percentage rate of each area contained between both adjoining columns, which have severally shown the number of microfilariae in 60 cmm. of the peripheral blood taken at two-hour intervals, to the total area contained between the first column and the last one on the histogram. In consequence of the experiment, it was observed that the peak of the number of microfilariae migrating into the peripheral blood tended to shift to right, increasing in the microfilarial appearance in the daytime day by day. On the 21st day after starting the experiment in dogs, the microfilarial count was found to be respectively 54·52% and 50·65% during the daytime (6 a.m. and 6 p.m.), while at night between 6 p.m. and 6 a.m. it was only 45·47% and 49·34%. The peak of curve shifted to the right as much as 10 hours in the end.

"The similar diurnal appearance in the periphery of the parasites was provoked by the same way in 4 cases out of seven carriers of Bancrofts microfilariae which had essentially shown a typical nocturnal periodicity. Especially, in a particular patient combined with parkinsonism, the microfilarial periodicity could be nearly entirely reversed at the 9th day of the experiment.

"To sum up, a prolonged treatment with chlorpromazine can cause a very significant change in the microfilarial periodicity, which suggests that disorder or reversal of the nocturnal periodicity must be linked up with a physiological response to sympaticomimetic drugs of the host. Furthermore, it may be in principle considered that the microfilarial cycle is somehow conditioned by the 24-hour physiological rhythm in the host."

TOBIE, J. E. & BEYE, H. K. **Fluorescence of Tetracyclines in Filarial Worms.** *Proc. Soc. Exper. Biol. & Med.* 1960, May, v. 104, No. 1, 137–40, 3 figs.

Tetracyclines fluoresce a yellow colour in ultra-violet light When administered to animals these compounds spread diffusely through the soft tissues, but they are concentrated in newly formed bone tissue, and also in filarial worms. Thus a woman infected with *Loa* was given 1 gm. tetracycline daily by mouth. 24 hours later, when examined under ultra-violet light, yellow fluorescent streaks could be seen on many parts of the body. These migrated in a circular fashion over a 5–6 inch area during 6 hours; during 24 hours they moved greater distances. They appeared to be due to worms migrating in the subcutaneous tissue.

In another experiment microfilariae of *Dirofilaria immitis* were exposed to a concentration of 1 mgm. tetracycline per ml. Within 5 minutes the nuclei of the microfilariae fluoresced. This fluorescence rapidly faded under illumination ("fatigue") owing to irreversible changes. The microfilariae also became photosensitive and died in about 1 minute under illumination.

A dog infected with *D. immitis* was given 40 mgm./kgm. tetracycline intravenously. Half an hour later it was killed. The adult worms were brilliantly fluorescent and so were microfilariae removed from the blood. In frozen sections most of the internal structures were fluorescent, but not the

cuticle. The uterus of the worm, and the microfilariae in it, were all fluorescent.

[This is an interesting paper which deserves study in the original.]

F. Hawking

DUKE, B. O. L. **Studies on the Biting Habits of *Chrysops*. VII. The Biting-Cycles of Nulliparous and Parous *C. silacea* and *C. dimidiata* (Bombe Form).** *Ann. Trop. Med. & Parasit.* 1960, June, v. 54, No. 2, 147–55, 5 figs.

It has proved possible to distinguish between female *Chrysops* that have laid eggs and those that have not by dissection and examination of the ovaries for follicular relics [this *Bulletin*, 1958, v. 55, 713]. Previous work [*ibid.*, 1956, v. 53, 352] had shown that *C. silacea* is attracted by wood fires burning at ground level in the forest and that the biting curve of this species at a wood fire was biphasic. The peak of biting activity in the morning (09.00 to 12.00 hours) is shown here to be due mainly to the activity of nulliparous flies, and the peak of activity in the afternoon (16.00 to 18.00 hours) to be due mainly to the activity of parous flies. In the absence of a wood fire, nulliparous and parous flies attracted by single fly boys did not show any obvious difference in the period of activity.

With *C. dimidiata* (Bombe form), which up to 1955 had been confused with *C. silacea* [*ibid.*, 1958, v. 55, 924], the biting curve at the wood fire was not obviously biphasic but parous flies tended to be more frequent after 13.00 hours, and the morning activity was due mainly to nulliparous flies. Similar activity was found in the absence of a wood fire, although the biting activity of nulliparous flies fell off more markedly during the afternoon.

Infections with *Loa loa* were found only in flies classified as parous and there were no significant differences between the biting activity of infected and uninfected parous flies. It is not possible to recognize parous *Chrysops* from external characters.

B. R. Laurence

LEWIS, D. J. **Observations on *Simulium damnosum* in the Southern Cameroons and Liberia.** *Ann. Trop. Med. & Parasit.* 1960, June, v. 54, No. 2, 208–23, 6 figs. [32 refs.]

Methods for examining and maintaining adult *Simulium* are described [see also this *Bulletin*, 1958, v. 55, 297]. There are numerous observations on variation in size, the state of the ovaries, the number of relict eggs, oviposition and parasites of *S. damnosum* [*ibid.*, 1953, v. 50, 543].

Collections of biting females near Kumba, southern Cameroons, and on the river Lofa, Liberia, showed little evidence of any difference between the biting activity of nulliparous and parous females during the day and the author suggests that it may be significant that these collections were made in wooded country, whereas differential activity in *S. damnosum* between the biting cycles of nulliparous and parous flies had been observed previously in savannah country [*ibid.*, 1958, v. 55, 297 ; 1959, v. 56, 77].

It is also suggested that thickly wooded country restricts the movement of *Simulium* and reduces contact with man. Out of 1,292 flies dissected in the southern Cameroons, 316 had laid eggs and 12·7% of these were infected with *Onchocerca volvulus* or related species. In Liberia 241 flies were dissected, of which 107 were parous, and 2·8% of these contained sausage stage, and 0·9% developing, filariae. Dissection of flies fed on an infected host after a blood meal [the time after the blood meal is not specified] showed that many microfilariae are trapped by the peritrophic membrane [*ibid.*, 1953, v. 50, 543] but that the number trapped is not great enough to explain the apparent decrease in number between ingestion and development of the filariae to the infective stage. *B. R. Laurence*

BROWNE, S. G. **Observations on *Simulium neavei* Roubaud, with special reference to a Focus of Onchocerciasis in the Belgian Congo.** *Bull. Entom. Res.* 1960, Apr., v. 51, Pt. 1, 9–15, 2 figs. on pl. [12 refs.]

Onchocerciasis is present in the human population in a district in the Oriental Province of the Belgian Congo, situated just north of the Equator between 23° and 25°E. in tropical rain forest. [See also this *Bulletin*, 1960, v. 57, 622.] One focus at Bokuma abuts on to the south bank of the River Congo, and another focus is situated about 20 miles south of the main river. In these two principal foci all the adult inhabitants were found to be infected. The only species of *Simulium* found biting man was identified as *S. neavei*. Most females were captured biting in forest clearings up to 1 mile from streams, especially near coffee bushes. Disturbance of the vegetation and humus beneath trees was followed by biting activity. About 10% of the biting females were captured at human bait near houses and only about 2% were found " near watercourses ". Females were especially active between 07.30 and 10.00 hours and between 16.00 and 17.30 hours. Most females (85%) were found to bite on or below the knees. Out of 239 females dissected, 12 were found to be infected with *Onchocerca*.

Larvae and pupae of *Simulium* were found on crabs in localized stretches of less accessible streams at higher altitudes [the area is between 1,350 and 1,650 ft. above sea level] with a flow of 3½ to 7 km. per hour. Five species of crab (*Potamon*) were found in these streams. The larvae were found on the walking legs of the crabs (240 larvae), on the carapace (178 larvae) and on the chelipeds (111 larvae). Crabs smaller than 2 cm. across the carapace did not carry *Simulium* larvae and a higher percentage of the larger crabs was found to be infested.

Treatment of the breeding places with Neocide M25 (containing 25% DDT), so as to produce a concentration of 1 part per 500,000 for 30 minutes, produced a marked reduction in the numbers of adult *Simulium* after 10 applications at 10-day intervals. This treatment was found not to kill the crabs in the streams but dead fish were found after these applications. 4 to 6 months later larvae and pupae of *Simulium* were found on crabs in some of the treated streams.

B. R. Laurence

LEWIS, D. J. **Observations on the *Simulium neavei* Complex at Amani in Tanganyika.** *Bull. Entom. Res.* 1960, Apr., v. 51, Pt. 1, 95–113, 40 figs. [Numerous refs.]

Two members of the *Simulium neavei* complex were studied and are referred to here as the unbanded and banded forms. Pupae of the unbanded form were predominant on the freshwater crab, *Potamon lirrangensis,* yet the adults of this form were not seen to bite man. Females of the banded form bit man readily and observations on the follicular relics in the ovaries indicated that the females of this form bite soon after laying eggs. Peaks of biting activity were usually found in the morning and also in the afternoon. There was some evidence that most parous flies biting in the afternoon did so earlier than nulliparous flies. Old females can be recognized, as in *S. damnosum,* by the clear appearance of the Malpighian tubules. Out of 359 females dissected, 41·2% were found to have laid eggs, and of these 12·8% were found to be infected, 1·4% with head infections. Some of these infections were determined as *Onchocerca volvulus,* but other third stage filariae belonged to some other species.

Notes are also given on the dissection of adult *Simulium,* especially with reference to ovary development, and on the association of the two forms of *S. neavei* with freshwater crabs. *B. R. Laurence*

RICCI, M. Sulla influenza dell'ambiente scolastico nella diffusione della ossiuriasi. [**The Effect of the School Environment on the Diffusion of Oxyuriasis**] *Rendiconti Istituto Superiore di Sanità.* Rome. 1960, v. 23, Pt. 2, 176–88, 3 figs. English summary.

See this *Bulletin,* 1960, v. 57, 269.

GOULART, E. G. Diagnóstico e tratamento da enterobiose. [**Diagnosis and Treatment of Enterobiasis**] *Rev. Brasileira Med.* Rio de Janeiro. 1959, Nov., v. 16, No. 11, 756–60, 2 figs. English summary.

The author states that the effects of an *Enterobius* infection must not be underestimated as the worm may cause definite clinical symptoms.

A group of 35 children aged 1–12 years, patients in the St. Zacharias Hospital at Rio de Janeiro who had already been treated by anthelmintics, were selected for diagnosis and treatment in 3 phases: (a) diagnosis by faecal examination including Faust's method; (b) diagnosis by special methods (Jacob's modification of Graham's method); (c) mass treatment by a 20% solution of piperazine hydrate. The doses were as follows: (1) patients aged 1–2 years, 5 cc. once daily; (2) aged 3–5 years, 10 cc. given in 2 doses of 5 cc. daily; (c) over 5 years, 15 cc., 10 cc. in the morning and 5 cc. at night. In all cases treatment was continued for 4 days.

It was found that by Faust's method, only 2 of the 35 were positive for *Enterobius*; by Jacob's method, 7 patients were positive, but after treatment 13 were found positive. Ova in specimens prepared by Jacob's method remained unchanged for 40 days. 5 patients previously negative were found positive after treatment, 2 patients had *Ancylostoma* spp. also, and 16 passed *Ascaris.* The drug was well tolerated and no side effects were seen.

In view of the life history of the helminth the author suggests the following scheme of treatment: (a) initial treatment [presumably 4 days], 30 days' interval, second treatment, 30 days' interval, then third treatment.

[According to the table, 7 patients were negative to all tests.]

W. K. Dunscombe

BUMBALO, T. S., PLUMMER, Lois J. & WARNER, J. R. **A Clinical Evaluation of Four Oxyuricides.** *J. Dis. Children.* Chicago. 1960, May, v. 99, No. 5, 617–21. [16 refs.]

Enterobiasis constitutes an increasing problem in residential institutions for children in the United States. The authors describe a therapeutic trial of 4 compounds which they carried out in Buffalo, the drugs tested being pyrvinium pamoate (Vanquin, Poquil or Povan), piperazine citrate combined with a recently synthesized piperazinium salt named 55–44A, piperazine citrate together with the wetting agent dioctyl sodium sulphosuccinate (aiming to secure better penetration of the cuticle of the worm), and dithiazanine iodide (Telmid).

The diagnostic methods used comprised examination of 2 successive Cellophane tape swabs taken in the early morning before bathing; cure was pronounced when 7 successive daily swabs, beginning 7 days after completion of treatment, all proved negative.

The dosage used and results obtained may be summarized for each compound as follows:—

(i) pyrvinium pamoate, 5 mgm. per kgm. in a single dose: 100% of 17 children cured.

(ii) piperazine citrate with 55–44A, 1,000 mgm. of the former and 250 mgm. of the latter daily for 2 days to children of 30–60 lb. weight; double this dose daily for 2 days for those over 60 lb.; 51% of 35 children cured.

(iii) piperazine citrate with LB–188 (wetting agent), 275 mgm. of the former with 100 mgm. of the latter twice daily for 5 days for children weighing 30–60 lb.; twice the above dosage twice daily for 5 days for children exceeding 60 lb.: 50% of 24 children cured.

(iv) dithiazanine iodide, 50 mgm. thrice daily for 5 days for children of 30–60 lb. weight; double this dosage for children exceeding 60 lb. weight: 100% of 25 children cured.

It is clear that piperazine needs to be given for a longer period than 2 days in order to rival the other 2 drugs in efficiency as an oxyuricide.

All the compounds tested proved non-toxic and free from serious side effects, though dithiazanine provoked mild gastro-intestinal irritation in about 60% of the treated children.

J. H. Walters

KEELING, J. E. D. **The Effects of Ultra-Violet Radiation on** *Nippostrongylus muris.* **I. Irradiation of Infective Larvae: Lethal and Sublethal Effects.** *Ann. Trop. Med. & Parasit.* 1960, June, v. 54, No. 2, 182–91, 2 figs. [29 refs.]

"1. Infective larvae of *Nippostrongylus muris* were exposed to radiations from a cold cathode mercury-vapour resonance lamp with an output of 15

microwatts per cm.^{2} emitting over 80 per cent. of its ultra-violet radiation in the region of 2,537 A.

"2. An exposure of four minutes at a distance of 0·5 cm. was sufficient to immobilize all larvae irreversibly.

"3. Larvae which had received smaller doses and appeared normal were incapable of reaching maturity after inoculation into young rats.

"4. When an aqueous suspension of larvae, 4 mm. deep, was exposed at a distance of 8 cm. for 32 seconds, the larvae did not complete their development in rats.

"5. At a distance of 8 cm., with the larvae absorbed on to a filter-paper 'irradiation mat,' exposure for 16 seconds completely inhibited development to the adult stage.

"6. It is concluded that the suspending medium protected the larvae from the full effects of the radiations. This may be interpreted as evidence of the direct action of the radiations on the larvae.

"7. The effects of irradiation on the larvae are considered, and possible causes of failure during migration in the host are discussed."

USZACKA, Magdalena. Przypadek włośnicy u norki. [**Incidence of Trichinellosis in a Mink** (*Lutreola lutreola*)] *Wiadomości Parazytologiczne*. Wroclaw. 1960, v. 6, Nos. 2/3, 203–4, 1 fig.

The English summary appended to the paper is as follows:—

"The author reports on an invasion of *Trichinella spiralis* in a mink, infected under natural conditions in a furred animals farm near Warsaw. This is a casuistic contribution to the whole of trichinellosis problems in Poland."

RITTERSON, A. L. **Innate Resistance of Species of Hamsters to** *Trichinella spiralis* **and its Reversal by Cortisone.** *J. Infect. Dis.* 1959, Nov.–Dec., v. 105, No. 3, 253–66, 19 figs. [19 refs.]

In a previous paper [this *Bulletin*, 1958, v. 55, 201] the author showed that the Chinese hamster (*Cricetulus barabensis*) like the golden hamster (*Mesocricetus auratus*) is susceptible to infection with *Trichinella spiralis*, in that a proportion of the ingested larvae develop to sexual maturity in the gut of both species. On the other hand, whereas the golden hamster allows a high proportion of the larvae produced by the adult females to reach the infective stage in its muscles, the Chinese hamster is highly refractory to this development.

In the present paper the author pursues the subject further and states that no clear immunological difference was observed between the sera of the two hosts and he is of the opinion that the failure of the larvae to develop in the Chinese hamster is probably due to an innate, as distinct from an acquired, resistance. A very interesting finding was that this innate resistance was greatly reduced by the administration of cortisone, which "... delays the early round cell response around invaded muscle fibers and permits survival of the contained larva. . . .

"It was concluded that the golden hamster has no innate resistance to *T. spiralis* infection. Moreover, it was demonstrated that the muscle tissue of

this host has no intrinsic resistance to the tissue phase of the parasite and that muscle-cell invasion is followed by a rather slowly progressing degeneration of the host cell. . . .

"It was concluded that the Chinese hamster is innately resistant to *T. spiralis*. The refractoriness of this host is most clearly expressed against the tissue phase of the parasite and seems not to be related to 'natural' or early antibody response. It was postulated that a premature disintegration of the parasitized muscle fiber (hypersusceptibility) accounts for the observed resistance. Furthermore, it was suggested that cortisone acts by prolonging the structural integrity of injured cells."

[These conclusions are based on the results of very carefully planned and extensive experiments, the full details of which are given in the original paper.]

R. M. Gordon

DEFICIENCY DISEASES

East African Council for Med. Res. **Scientific Conference on the Origin and Effects of Malnutrition in Man and Animals held at Dar es Salaam in January, 1960.** *East African Med. J.* 1960, May, v. 37, No. 5, 309–431, numerous figs. [Numerous refs.]

The papers presented at this conference, covering a wide range of subject matter, were interesting and constructive. Taken as a whole they show that research on problems of nutrition in Africa is being actively pursued and leading to a clearer understanding of these problems.

His Excellency the Governor of Tanganyika, Sir Richard Turnbull, in a thoughtful opening speech, pointed out that "In the fight against malnutrition, as in the case of all medico-social problems, success depends on efforts on many fronts . . . nutritionists . . . cannot hope to manage by themselves. Their studies require not only research by biochemists, physiologists and all the rest of the medical and allied workers' union, but the close co-operation of the agriculturist, the veterinary man and the soil conservation expert . . . their results cannot be fully translated into bettering the lot of the ordinary man, and by the ordinary man in Tanganyika I mean the peasant cultivator, the yeoman farmer and the urban worker, without the help of the educationist, the sociologist and the expert in the techniques of community development". Many of the participants in the conference showed that they were aware of these facts.

B. S. Platt, in his presidential address, emphasized the association between malnutrition and helminthic disease and the need to frame and execute food and nutrition policies. He deprecated talk of the "lazy African", feeling that indolence was usually the result of ill-health and malnutrition. He drew attention to the recent production of protein malnutrition in pigs in the Human Nutrition Research Unit in London (*Summary of paper on Experimental Protein Malnutrition in Animals*, pp. 319–320); this experimental condition should throw considerable light on the human disease. D. S. McLaren (*The Role of Malnutrition in Eye Disease: Results of Surveys in Lake and Central*

Provinces, Tanganyika, pp. 321–331) described the difficulties in differentiating between nutritional and non-nutritional eye diseases, but reported a high incidence in Tanganyika of xerophthalmia due to vitamin A deficiency. The papers of J. S. MEREDITH (*Oedema States associated with Malnutrition,* pp. 332–335) and A. M. NHONOLI (*The Differential Diagnosis of Malnutrition in Children,* pp. 336–342) dealt with the various manifestations of malnutrition, its association with infections and parasitic disease, and differences in the clinical picture in different parts of East Africa. I. MANN (*The Conversion of Unproductive Animals from Overstocked Areas into High Protein Human Food,* pp. 343–377) hoped that the anomaly of heavy overstocking with livestock in certain areas with shortage of protein elsewhere could be overcome by the development of transport and the introduction of meat conservation and processing, laying special emphasis on the potential value of dried meat powder. He was followed by R. F. A. DEAN (*The Use of Plant Proteins in the Diets of Young Children,* pp. 378–383) who expressed the view that protein requirements in Africa can best be met by combinations of plant and animal proteins, and described a biscuit based on maize and groundnut, with an addition of skim-milk powder, which had been produced in the Infantile Malnutrition Research Unit of the Medical Research Council in Kampala, and successfully used in treating kwashiorkor patients. H. J. L. BURGESS (*The Medical Research Council's Rural Child Welfare Clinic,* pp. 391–398) pointed out that while an outpatient clinic can deal with serious cases of malnutrition it can do little as yet to prevent the appearance of its earliest signs. The curing of kwashiorkor patients had, however, considerable educational value. The psychological and social factors which play an important part in the causation of kwashiorkor were discussed by Ann P. FARMER (*Malnutrition as an Ecological Problem,* pp. 399–404), who concluded that "although a long period on a low protein diet is a basic requirement for the development of kwashiorkor, additional factors are necessary for its precipitation".

D. B. JELLIFFE, B. E. R. SYMONDS and E. F. P. JELLIFFE (*Childhood Malnutrition and the Technical Development of Tropical Regions,* pp. 405–409) on the basis of experience in Trinidad, considered the prolongation of breast feeding, through health education, an important preventive measure; such prolongation would reduce the incidence of the infective diarrhoea which often precedes an attack of protein malnutrition. G. W. GALE's paper (*Food Balance Sheets for the African Populations of East Africa,* pp. 410–417), which included some informative figures, had a close bearing on the establishment of food and nutrition policies. He concluded that "there is no overall basic shortage of foodstuffs in any of the three East African territories. If malnutrition is widespread in East Africa, therefore, it must be due rather to maldistribution of food among the African population: geographical, seasonal, demographic". M. C. LATHAM (*Malnutrition as a Cause of Anaemia in Children,* pp. 418–423) produced data suggesting that deficiency of protein may be among the causes of the anaemia which is almost universal in tropical countries. The main contribution of A. J. WINMILL (*Some Vitamin Deficiencies of Poultry,* pp. 424–429) was the finding that vitamin deficiencies occurring in poultry produced commercially in Kenya could now be eliminated by vitamin concentrates, available at a reasonable cost.

While the emphasis at the conference was on practical and applied nutrition, an observation of fundamental physiological interest was reported by R. G.

WHITEHEAD and C. E. MATTHEWS (*The Analysis of Urine of Children Suffering from Kwashiorkor*, pp. 384–390), namely, that children with kwashiorkor excrete large amounts of "unaccounted" nitrogen in the urine, which disappears after successful treatment. The inference is that the widespread and profound cellular damage caused by protein malnutrition leads to the appearance in the urine of break-down products of cell constituents such as nucleic acid.

Platt, in summarizing, commented that the conference had dealt mainly with "food and disease" and hoped that the time would come when similar conferences would be primarily concerned with "food and health". He reiterated the "need for some agency in each territory which should be concerned with the collection of facts and the promotion of policies—a body such as the statutory Food and Nutrition Board recently set up in Ghana with committees on food production, processing, storage, consumption and distribution; medical nutrition; and nutrition education". *W. R. Aykroyd*

MCLAREN, D. S. **Nutrition and Eye Disease in East Africa: Experience in Lake and Central Provinces, Tanganyika.** *J. Trop. Med. & Hyg.* 1960, May, v. 63, No. 5, 101–22, 1 map & 9 figs. [42 refs.]

This paper gives an account of the Lake, Western and Central Provinces of Tanganyika—the country, the people, their principal foods, the heights and weights of the schoolchildren and their nutritional status, based on studies in 2 areas. A table lists the findings in an ophthalmic examination of 1,510 children and another shows measurements of mean refraction. Clinical findings regarding nutrition and eye conditions are shown in several other tables. This highly detailed paper should be read in the original [see also above].

R. Passmore

BAGCHI, K., HALDAR, K., CHOUDHURY, S. R., SANYAL, Bani & SEN, P. C. **A Study of Nutritional and Non-Nutritional Factors in the Incidence of Kwashiorkor in a Rural Area (Singur) of West Bengal.** *J. Indian Med. Ass.* 1960, June 1, v. 34, No. 11, 441–9, 5 figs. [10 refs.]

This paper is a study of the conditions leading to kwashiorkor in the neighbourhood of the Rural Health Unit at Singur. In many children the disease appears to follow immediately upon a gastro-intestinal disturbance; worm infection is also heavy. The need for better environmental sanitation is emphasized—cheap latrines are needed in the villages; although tube wells are generally available, pond water is frequently used for cooking and cleaning in the kitchen.

The supply of breast milk is frequently inadequate and few women can afford cow's milk. Sago and barley are used as infant foods, and the need to popularize cheap nutritious vegetable proteins is stressed. More auxiliary health workers with an interest in nutrition and dietetics are required in the villages. *R. Passmore*

BHARUCHA, P. E. & EDIBAM, B. C. **Treatment of Kwashiorkor.** *Indian J. Child Health.* 1960, June, v. 9, No. 6, 261–73. [41 refs.]

Two groups, each containing 11 children with kwashiorkor, were treated with a Multipurpose Food Formula prepared by the Central Food Technological Research Institute, Mysore, and based on Bengal gram and low-fat groundnut flour. In one group one-fifth of the protein in the diet was supplied by a milk protein preparation (Casilan). Both groups showed rapid clinical improvement in regard to skin changes, anorexia, diarrhoea and temperament. The addition of Casilan caused a greater rise in serum albumin than did the Food Formula alone. There is a useful bibliography. *R. Passmore*

SPRUE

MANSON-BAHR, P. **The Riddle of Tropical Sprue.** *J. Trop. Med. & Hyg.* 1960, Mar., v. 63, No. 3, 49–55, 3 figs. [32 refs.]

In this interesting paper knowledge concerning the structure of the intestinal villi, their movement and physiology, is first reviewed, and this is followed by a review of previously held opinions concerning the aetiology of tropical sprue. During the last century, Sir Patrick MANSON stated that he believed the disease process affected the small intestine with atrophy, a view which was later supported by many other observers but which was opposed by FABER in the early years of this century. Just before the first world war, BAHR conducted 2 autopsies in part-Europeans and 5 in indigenous patients with sprue in Ceylon. In his report published in 1915 he described flattening and deformity of the villi and marked inflammatory changes in the mucosa with fibrosis and congestion of blood vessels. The surface epithelium was intact, the goblet cells were distended and evidence of chronic inflammation was present. In the submucosa, fibrous tissue was increased and there was vascular congestion. In 1924 Sir Philip Manson-Bahr described autopsies on 2 patients who died of the disease in London. There was general atrophy of the villi and diffuse round-cell infiltration of the mucosa resembling closely the earlier findings in Ceylon. In 1929 MACKIE and FAIRLEY drew attention to "withering of the villi" in autopsy material from some of their patients with sprue but as the autopsy examinations were conducted after considerable and unavoidable delay without refrigeration of the body they doubted the validity of their findings. Hess THAYSEN in 1932 [this *Bulletin,* 1933, v. 30, 57] reported that in cases in which the abdominal cavity had been injected with formalin immediately after death the small bowel was normal and his work, Sir Philip concludes, retarded the elucidation of the disease.

Within the past 4 years SHINER has developed a method of jejunal biopsy by which means it has been demonstrated that in idiopathic steatorrhoea changes in the villi vary "from clubbing and mushrooming" to almost total flattening and that in tropical sprue subtotal villous atrophy may occur and may be followed by regeneration after administration of folic acid. From this and

from other studies carried out in America it has been concluded that "disturbed function accompanies the pathological changes in the columnar layer and contributes, along with the factor of reduced absorption surface, towards the genesis of the malabsorption syndromes".

It is of some satisfaction, Sir Philip confesses, to find that after 45 years his work in Ceylon has been amply confirmed. *A. W. Woodruff*

BOLT, R. J., POLLARD, H. M. & MCCOOL, Sararuth. **Staining of Enzymes in Mucosa of the Small Bowel, using a Peroral Biopsy Tube.** *Amer. J. Clin. Path.* 1960, July, v. 34, No. 1, 43–9, 7 figs. [18 refs.]

A biopsy tube which can be introduced by mouth and pushed as far as the small bowel has been used to obtain epithelial cells from that area. These were then stained and also examined histochemically for alkaline phosphatase and non-specific esterases. Furthermore, extracts of these cells were treated by electrophoresis and the separated fractions examined for hydrolytic properties.

There was a moderate decrease of non-specific alkaline phosphatase activity in patients with primary sprue, the enzyme itself being localized in the epithelial cells.

By electrophoresis of cell extracts it could be demonstrated that there are at least 6 electrophoretically distinct hydrolytic enzymes in the mucosa of the small bowel. They were found both in patients with, as well as without, absorptive difficulties. The findings are illustrated in 6 photomicrographs and an electrophoretic figure. *H. Lehmann*

FELDMAN, Elaine B. & ADLERSBERG, D. **Response to Carotene Loading in Malabsorption States.** *Amer. J. Med. Sci.* 1959, Dec., v. 238, No. 6, 733–8, 1 fig. [12 refs.]

The level of circulating carotene reflects the intake and absorption since it is not stored.

On 9 healthy subjects, 10 patients with non-tropical sprue controlled by steroid therapy, one patient with tropical sprue, one with coeliac disease in remission, one with non-tropical sprue in remission and 3 others (intestinal lipodystrophy, post-pancreatectomy for carcinoma and post-resection of small intestine for jejuno-ileitis) spectrophotometric estimations were made before and 1, 2, 3, 4 and 7 days after administration of 120 mgm. (200,000 IU) of carotene in 20 gm. butter. During the test, foods containing carotene were avoided.

Serum vitamin A estimations were also made before and 4, 6 and 8 hours after administration of 180,000 IU of the vitamin. Fat analyses of 72-hour stool collections were made and B12 absorption was studied in 11 patients.

In the controls the mean carotene increment above the initial mean level of 141 μgm. in the serum was 46 μgm. In the patients with malabsorption syndromes, the initial mean was 26 μgm. and the increment only 9 μgm. In the patients in remission the initial mean values were normal but the increment was low in the coeliac patient. Steatorrhoea was present in all except the

patient suffering from lipodystrophy; vitamin A absorption was poor in all malabsorption syndromes except this patient and the patient with intestinal resection. Absorption of B12 was low except in one patient with sprue.

The authors define an abnormal carotene loading test as one in which the peak reaches less than 100 μgm. per 100 ml. serum. The results were all abnormal in the patients with malabsorption syndromes. The test should be useful for diagnostic purposes. *B. G. Maegraith*

RODRIGUEZ-MOLINA, R., CANCIO, Marta & ASENJO, C. F. **The Effect of Folic Acid on the Steatorrhea of Tropical Sprue and Other Tests for Intestinal Absorption.** *Amer. J. Trop. Med. & Hyg.* 1960, May, v. 9, No. 3, 308–14, 2 figs. [15 refs.]

As is well known tropical sprue is frequently encountered in Puerto Rican war veterans, particularly those of over 40 years of age. Since SUÁREZ and his colleagues in 1947 [this *Bulletin*, 1947, v. 44, 1089] established that folic acid is an efficient agent in the treatment of tropical sprue as it occurs in Puerto Rico, no controlled fat-balance studies seem to have been undertaken to determine its effect upon this malabsorption defect, as indicated by the presence of steatorrhoea and by the results of other tests for intestinal absorption, such as the oral glucose tolerance, vitamin A tolerance, and the D-xylose excretion test. In order to fill in this gap the present study was undertaken in patients with steatorrhoea in whom other tests for intestinal absorption were observed to be abnormal.

To determine the degree of steatorrhoea in a sprue patient it is necessary to administer a standard diet containing a constant amount of digestible fat in addition to other foodstuffs and to determine the total daily output of fat in the faeces.

10 patients were included in this study, 8 white and 2 coloured. With the exception of 2, all were over 60 years of age and were from Puerto Rico. The diagnostic criteria were those usually accepted, including insidious onset, chronic symptoms and infrequent spontaneous remission; gastro-intestinal disturbances; stomatoglossitis, with or without atrophy of the lingual papillae; early loss of weight accompanied by increasing weakness and prostration; free HCl in the stomach; macrocytic, hyperchromic anaemia associated with a megaloblastic marrow and absence of neurological manifestations. Treatment consisted of 15 mgm. of folic acid given daily, in 3 doses of 5 mgm. each, taken immediately after meals.

The results of 12 fat-balance studies in the 10 subjects are shown. Severe steatorrhoea (over 12 gm.) was observed in 7 subjects during the period of observation before treatment; mild steatorrhoea occurred in 5 and during the period of folic acid administration severe steatorrhoea was noted in 8, while no steatorrhoea was observed in 4. The oral glucose tolerance test showed no change in 5—that is to say the flat curve was unaffected by treatment. 2 gave normal levels and the eighth became worse. In the oral vitamin A test improvement was observed in 4 of the 5 tested and values after treatment reached normal levels. The D-xylose absorption test showed some improvement in 5 patients, but results after treatment were below normal levels.

In spite of these figures clinical improvement under folic acid was noted in all, with the exception of one (who was discharged after 9 days of treatment). All others showed improvement in general condition, glossitis and diarrhoea.

When the data obtained were subjected to statistical analysis and the significance of the difference between means was measured for each case, it was found that in 8 patients it was probably not significant, which indicates that folic acid did not produce a significant change in the steatorrhoea. The same applied when results for all 12 patients were analysed as a unit. This therefore indicates that folic acid appeared to have no effect on the steatorrhoea.

The minimal effect of folic acid revealed by these studies was reflected in its weak effect on haemopoiesis and haemoglobin production. Length of treatment *per se* is not the only factor responsible for inadequate haematological response. This was emphasized in the case of 2 patients who, though treated longer than the others, did not attain normal red cell and haemoglobin values. *Philip Manson-Bahr*

HAEMATOLOGY

ARGIOLAS, Natale. Interesse medico-sociale di alcune anomalie ematologiche nei sardi. **[The Medico-Social Aspects of Certain Blood Anomalies in the People of Sardinia]** *Arch. Ital. Sci. Med. Trop. e Parassit.* 1960, May, v. 41, No. 5, 261–74. [69 refs.] English summary.

The author draws attention to the evidence of Cooley's anaemia which is often encountered in the people of this island, and refers to the findings which have been reported from time to time by various local workers on the subject.

Examination of blood specimens is reported to have shown: (a) often an increased osmotic resistance of the cells; (b) very often an increase in the proportion of microcytes with a reduction in the horizontal diameter of red cells; (c) elliptocytes, poikilocytes, "target cells" and schistocytes in many of the subjects; (d) an increase in the number of erythroblasts, a lowered ratio of leucocytes to erythrocytes and basophilia in the bone marrow of both children and adults; (e) a tendency to bilirubinaemia, hypersideraemia and a higher rate of haemoglobin exchange.

It is suggested that the prevalence of malaria may have some bearing on the high incidence of this microcytaemia. *J. Cauchi*

ROSSI, E. **The Abnormal Hemoglobins.** *Amer. J. Med. Sci.* 1960, July, v. 240, No. 1, 93–109, 3 figs. [115 refs.]

CORRAL, J. F. & UNANUE, E. R. Survey sobre hemoglobinas en la raza negra en Cuba. Reporte preliminar. [**Survey of Haemoglobins in Coloured Persons in Cuba**] *Rev. Cubana Lab. Clin.* 1960, Apr.–May–June, v. 14, No. 2; 57–9. [13 refs.]

The authors surveyed 200 healthy persons (Negro and half-caste) in Cuba for haemoglobins by means of paper electrophoresis. These consisted of 130 men and 70 women from the Cuban blood bank or from a maternity hospital.

Haemoglobin S was found in 5 men and 8 women and haemoglobin C in one man. Thus, the incidence of Hb S was 6·5% and of Hb C 0·5%. It is not clear why the Hb S trait was more common in women.

H. J. O'D. Burke-Gaffney

ATWATER, Jean, SCHWARTZ, I. R. & TOCANTINS, L. M. **A Variety of Human Hemoglobin with 4 Distinct Electrophoretic Components.** *Blood.* 1960, June, v. 15, No. 6, 901–8, 6 figs. [19 refs.]

"A human hemoglobin with four distinct electrophoretic components was observed in an individual with leptocytosis and reticulocytosis. Three of the components were the previously reported hemoglobins A, C and G. The fourth (Porter) with a mobility of zero on conventional paper electrophoresis in alkaline buffer of pH 8·6, appears to be a new component arising as a result of the random association of the other two abnormal components."

EPIDEMIC DROPSY

SANGHVI, L. M., MISRA, S. N. & BOSE, T. K. **Cardiovascular Manifestations in Argemone Mexicana Poisoning (Epidemic Dropsy).** *Circulation.* New York. 1960, June, v. 21, No. 6, 1096–1106, 7 figs. [34 refs.]

"Cardiovascular manifestations have been studied in 11 patients with argemone oil poisoning.

"Tachycardia, alterations in the heart sounds, cardiac enlargement, or electrocardiographic and ballistocardiographic changes indicated myocardial involvement in every case. The latter was suggestive of a nonspecific type of myocarditis and was considered to be of a minor nature. The prominent manifestations included dyspnea, edema, hepatic enlargement, and pulmonary congestion. The last 3 were probably due to capillary dilatation, whereas the cause of dyspnea was uncertain.

"These manifestations suggested the presence of cardiac failure, which, however, was considered unlikely except in 1 case."

VENOMS AND ANTIVENENES

SASA, M., TERUYA, K., UCHIYAMA, H. & IWAI, S. **Epidemiology of the Poisonous Snakebite in the Amami and the Ryukyu Islands.** *Japanese J. Exper. Med.* 1959, Oct., v. 29, No. 5, 417–44, 10 figs. [13 refs.]

The authors report the results of a careful survey of the epidemiological features of snake bite, which is a serious problem in the Amami and Okinawa Islands and in the Yaeyama archipelago. The snake concerned in the former area is the "habu", *Trimeresurus flavoviridis*, in the latter *T. elegans*. Although other pit vipers and sea snakes occur in these regions they are of little practical importance.

In both Amami and Okinawa about 300 cases of habu bite occur annually; the incidence exceeds 3 per 1,000 in some rural areas. Snake bite is commonest in early and late summer months, when the soil temperature reaches about 27°C. Although the snake is basically nocturnal in its habits, bites occur most frequently in the morning or early evening. In some 2,000 incidents bites from *T. flavoviridis* occurred most commonly in the country (41%) and about equally in cultivated fields (26%) and on the road (20%). Bites were recorded within houses, even in bed and in the lavatory. *T. elegans* bites occurred almost exclusively in the open fields.

Bites occurred most frequently on the foot, the hand and lower leg, in that order. Except among young children, males were bitten more often than females.

The fatality rate was high when muscular areas were bitten; it was highest in the very young and the old. Incidence of biting rose with age to young adults, after which it remained steady until 70.

T. flavoviridis is an unusually aggressive snake. In "attacking . . . [it] winds the body and holds up the head first, and then jumps . . . with its mouth wide open and the pair of poison fangs stretched forward".

The bite is painful and the local injury is severe, with extensive oedema and rapidly developing and spreading necrosis of all tissues. Amputation of a limb is sometimes necessary. In fatal cases, signs of intoxication of the central nervous system or heart develop rapidly and death may occur within 36 hours.

B. G. Maegraith

KOCHWA, S., PERLMUTTER, Chaja, GITTER, S., RECHNIC, Jadwiga & DE VRIES, A. **Studies on *Vipera palestinae* Venom. Fractionation by Ion Exchange Chromatography.** *Amer. J. Trop. Med. & Hyg.* 1960, July, v. 9, No. 4, 374–80, 4 figs. [22 refs.]

"*Vipera palestinae* venom was fractionated by chromatography on DEAE cellulose.

"Two neurotoxic and three hemorrhagic fractions were obtained. The calculated recovery of total lethal activity was 75 per cent, about two-thirds of which was neurotoxic, one-third hemorrhagic.

"Correlations of biological activities of the various venom components are discussed.

"In addition to the known anticoagulant, a procoagulant accelerating the conversion of fibrinogen to fibrin in the presence of thrombin was found."

[See this *Bulletin*, 1957, v. 54, 873.]

HENRIQUES, Olga B., FICHMAN, Mina & HENRIQUES, S. B. **Partial Purification and some Properties of the Blood-Clotting Factor from the Venom of** *Bothrops jararaca*. *Biochem. J.* 1960, June, v. 75, No. 3, 551–6, 2 figs. [28 refs.]

HENRIQUES, Olga B., FICHMAN, Mina & BERALDO, W. T. **Bradykinin-Releasing Factor from** *Bothrops jararaca* **Venom.** [Correspondence.] *Nature*. 1960, July 30, v. 187, 414–15.

LEOPOLD, R. S. & HUBER, G. S. **Ineffectiveness of Suction in Removing Snake Venom from Open Wounds.** *U.S. Armed Forces Med. J.* 1960, June, v. 11, No. 6, 682–5.

In this experiment standard wounds were made in the adductor magnus muscle of the rear leg of rabbits. [It is not stated whether or not the animals were anaesthetized.] 20 animals formed an experimental group, and 10 served as a control group. Into the wound of each animal 40 mgm. of dried venom from *Crotalus adamanteus* (eastern diamond-back rattlesnake) in 20% aqueous solution was placed: this amount represented 6–8 MLD of venom. In the case of the animals of the experimental group an interval of 3 minutes was then allowed to elapse, after which vigorous suction was applied for 30 minutes to the raw muscle surfaces by means of a commercial suction pump supplied in the standard snake-bite treatment kit. All the animals used in the experiment were immobilized on a frame during manipulation and for 30 minutes afterwards, and were then returned to cages for observation.

The mean survival time of the animals treated by suction (157·5 ± 56·7 minutes) was significantly shorter than that of the control group (246·0 ± 34·8 minutes).

This [somewhat mediaeval] experiment appears to demonstrate that any manipulation enhances the absorption of snake venom and supports the authors' contention that immobilization should be the only physical treatment applied in addition to antivenene. They also state that earlier experiments have demonstrated that a tourniquet is no more effective than simple immobilization in diminishing lymph flow and venous return from an envenomated limb.

[No mention is made of cryotherapy.] *J. H. Walters*

PATTERSON, R. A. **Physiological Action of Scorpion Venom.** *Amer. J. Trop. Med. & Hyg.* 1960, July, v. 9, No. 4, 410–14, 1 fig.

"Venom of the scorpion, *Centruroides sculpturatus* Ewing, caused hypertension, respiratory failure, and skeletal muscle stimulation in anesthetized

animals. No significant action of the venom was found on isolated skeletal muscle preparations. Hypertension resulted in part from release of pressor substances from the adrenal gland, although neither direct action nor action mediated by vasopressor centers can be ruled out. Respiration and skeletal muscle stimulation followed a pattern which suggests an initial peripheral action followed by an action dependent on the central nervous system."

TOXOPLASMOSIS

GAŁUSZKA, J., SKORCZYNSKI, M. & SZAFLARSKI, J. Problematyka toksoplazmozy w piśmiennictwie polskim do roku 1960. [**Problems of Toxoplasmosis in the Polish Literature till 1960**] *Wiadomości Parazytologiczne*. Wroclaw. 1960, v. 6, Nos. 2/3, 173–84. [105 refs.] English summary.

HAVLÍK, O. & HÜBNER, J. **Findings of Toxoplasmosis among Cats in Czechoslovakia.** *J. Hyg., Epidemiol., Microbiol. & Immunol.* Prague. 1959, v. 3, No. 4, 450–57, 1 fig. [22 refs.]

The authors examined 200 cats in Central Bohemia by the dye test and found that 153 (76·5%) reacted to titres from 1 in 4 to 1 in 4,096. Two strains of *Toxoplasma* were isolated in mice from a total of 23 cats—in both cases from the brain, whereas other organs were negative.

Both their own findings and literary data indicated that—as in man and other animals—toxoplasmosis in cats may be acute or latent. The authors regard cats as important reservoirs of human infection in Czechoslovakia. On the basis of these observations, "the authors do not recommend the keeping of cats in the home. Pregnant women in particular should avoid any contact with them". *C. A. Hoare*

KIMBALL, Anne C., BAUER, H., SHEPPARD, C. G., HELD, J. R. & SCHUMAN, L. M. **Studies on Toxoplasmosis. III. Toxoplasma Antibodies in Obstetrical Patients correlated with Residence, Animal Contact and Consumption of Selected Foods.** *Amer. J. Hyg.* 1960, Jan., v. 71, No. 1, 93–119, 1 fig. [65 refs.]

The authors describe the results of dye tests for toxoplasmosis in obstetrical patients from 3 areas of Minnesota. The positive reactions are correlated with the patients' residence, their contact with animals and consumption of selected animal foods.

No significant difference was found in positive reactions between rural and urban inhabitants, but they were higher in patients from the northern area, the greater part of which is covered with water. There was also a higher percentage of positives among patients who lived on farms than among others. There was a significant correlation between positive dye-test reactions

and contact with farm animals, especially in patients who had contact with chickens, but positive reactions were not associated with contact with pigs, horses or domestic pets. Neither was there any significant indication of any association with consumption of pork, eggs or milk, though in one group of patients positive reactions were correlated with consumption of raw beef.

C. A. Hoare

ŠERÝ, V., ŠAUER, J., PHAM VAN NONG, JÍROVEC, O., JÍRA, J. & SEEMAN, J. **Study of Toxoplasmosis in Vietnam.** *J. Hyg., Epidemiol., Microbiol. & Immunol.* Prague. 1959, v. 3, No. 4, 444–9. [16 refs.]

While working in Haiphong in 1958–59, the authors made a survey of the incidence of toxoplasmosis in North Vietnam, for which the intradermal toxoplasmin (ITT) and complement-fixation (CFT) tests were used. Of 209 persons from 4 provinces examined by ITT, 6 (2·9%) reacted positively, while the incidence among women with a history of abortion (8·9% of 258) was higher than among those who had not aborted (2·5% of 319). In general, the proportion of positive intradermal reactions was lower than in Czechoslovakia [this *Bulletin,* 1958, v. 55, 213] and comparable to that in India. The CFT on sera from 138 unselected persons revealed significant titres in 7 cases (5·1%), but in 104 women patients of the Gynaecology Department, positive reactions were found in 19·2%. Significant titres in the CFT were shown in dogs, rabbits, buffaloes, a pig, and macaque monkeys, but in birds the results were negative.

C. A. Hoare

SCHUHOVÁ, V. **Long-Term Culture of *Toxoplasma gondii* on HeLa Cells.** *J. Hyg., Epidemiol., Microbiol. & Immunol.* Prague. 1960, v. 4, No. 1, 131–2.

Some rather remarkable observations on the long survival of *Toxoplasma gondii* in tissue culture are reported here. Strain C B (after 9 serial passages) was inoculated into stationary HeLa cell cultures in 1956 and was maintained alive for 33 months. The epithelium alternately degenerated and proliferated, while at the same time the organisms diminished greatly in numbers and then increased, but auto-sterilization never occurred.

Samples were taken from the cultures at 5 intervals during the 33 months and were inoculated into white mice; the virulence proved to be the same throughout. Thus the equivalent of a chronic infection arose in the culture, in the absence of any immune response, and it is suggested that *in vivo* the virulence and invasiveness of *Toxoplasma gondii* are so slight that the infection remains localized, and that it usually occurs in the latent form.

P. C. C. Garnham

KULASIRI, C. **The Indicator System of the Sabin-Feldman Phenomenon in *Toxoplasma*.** *Parasitology.* 1960, May, v. 50, Nos. 1/2, 13–20. [16 refs.]

[In this paper the term "indicator" should be taken to mean "dye" since there is no acid-base system involved.]

The author sets out to explain the discrepancies in the literature of the Sabin-Feldman dye test. He shows that the substances azure A and azure B (MacNeal) are effective in saline as well as in alkaline solution, in contrast to methylene blue itself which has to mature in alkaline solution before it becomes effective. A number of other dyes were tested. Some of these were found active, others inactive, but these findings were not in every case in agreement with those published by other workers. The author points out that this discrepancy is likely to be due not so much to divergencies in technique as to doubt of the identity and purity of the dyes used.

W. E. Ormerod

ZAWIRSKA, Bożenna. Toksoplazmoza wrodzona w materiale Zakładu Anatomii Patologicznej we Wrocławiu. [**Congenital Toxoplasmosis in the Material of the Institute of Pathological Anatomy in Wroclaw**] *Archiwum Immunol. i Terapii Dośw.* Wrocław. 1959, v. 7, No. 4, 765–86, 11 figs. on 6 pls. [71 refs.] English summary.

In autopsies carried out in 1957 and 1958 in Wrocław, Poland, the presence of toxoplasmosis was established in 5 of 151 infants aged up to 3½ months, in 10 of 123 full-term and 7 of 182 premature infants. The correct diagnosis was not established during life. The 17 premature and full-term infants survived for up to 26 days; at autopsy chalk-white foci were found in the brain in 14 instances, external hydrocephalus in 1 and both external and internal hydrocephalus in 2 instances. The results of serological tests were positive in 9 instances. Some association was noted between congenital toxoplasmosis and blood group incompatibility.

D. J. Bauer

DERMATOLOGY AND FUNGUS DISEASES

GUIMARÃES, O. P., PICKEL, D. B. J. & OLIVEIRA LIMA, A. O princípio toxi-alergênico das Anacardiaceae—O problema do *Rhus succedanea* na cidade de São Paulo. [**The Toxic-Allergic Principle of the Anacardiaceae: The Problem of *Rhus succedanea* in the City of Sao Paulo**] *Rev. Brasileira Med.* Rio de Janeiro. 1960, Jan., v. 17, No. 1, 43–8, 7 figs. [25 refs.]

The English summary appended to the paper is as follows:—

"After a review of the most important data on the chemistry and immunology of the antigenic principle of the family Anacardiaceae, are presented the results of studies carried out on 18 patients who became sensitized to *Rhus succedanea* (urushi, 'charão'), an Asiatic species of Anacardiaceae which is being cultivated in the city of São Paulo."

TSUTSUMI, C. **Structure, Development and Sting Mechanism of the Larval Poison Hair of *Artona funeralis* Butler (Lepidoptera: Zygaenidae).** *Japanese J. Med. Sci. & Biol.* 1959, Dec., v. 12, No. 6, 421–8, 2 text figs. and 5 figs. on pl.

Many cases of dermatitis were reported during 1959 in the Tokyo area from contact with the larvae of the moth, *Artona funeralis*, which is sometimes a pest of bamboos. It is concluded that fluid from the hairs of the caterpillars, injected into the skin from the apex of the hair, is responsible for the skin reaction. The chemical nature of this fluid is being investigated.

B. R. Laurence

BOCOBO, F., DE LEON, D. & REYES, A. **Black Grain Maduromycosis. (First Case reported in the Philippines.)** *J. Phillipine Med. Ass.* 1960, May, v. 36, No. 5, 345–50, 3 figs. [13 refs.]

This paper describes a case of mycetoma pedis attributable to *Madurella grisea* (Mackinnon, Ferrada and Montemayor). The descriptions of the gross pathology and histology of the lesion and of the cultural, microscopic and biochemical properties of the organism isolated tally with previous descriptions. The photographs could well be of sections of grains of *M. grisea*.

This is unquestionably a case of maduromycosis due to *M. grisea*, whose principal interest lies in its being the first such occurrence reported from the Philippines. Up till now only a few descriptions of yellow or white grain types of this disease have originated from those islands. *I. G. Murray*

JOFFE, B. **An Epidemic of Coccidioidomycosis probably related to Soil.** *New England J. of Med.* 1960, Apr. 7, v. 262, No. 14, 720–22.

An outbreak of coccidioidomycosis involving 33 people occurred in an Air Force base in Kern County, California, between September 1958 and February 1959. The author associated the clearing of large tracts of dry desert earth by bulldozers with this outbreak, for, prior to these operations, air sampling tests for fungi in this area did not reveal any spores of *Coccidioides immitis*.

In 16 of the patients "erythema nodosa or multiforme developed during the first two weeks of clinical symptoms", 5 female patients showing "serologically proved active coccidioidomycosis presented with no symptoms except skin rash". No other symptoms of coccidioidomycosis had been observed in 3 of these patients.

The author suggests methods of controlling dust in endemic areas scheduled for excavation. *C. J. La Touche*

LONES, G. W. & PEACOCK, C. L. **Role of Carbon Dioxide in the Dimorphism of *Coccidioides immitis*.** *J. Bacteriology.* 1960, Feb., v. 79, No. 2, 308–9, 1 fig.

The need for a continuous supply of the spherule phase of *Coccidioides immitis* for use in serial cultures led the authors to use the technique and medium described by CONVERSE [this *Bulletin*, 1958, v. 55, 93].

During the course of their work it was observed by them that a large inoculum consisting of spherules gave rise to a minimal amount of mycelium in the culture medium whereas a small inoculum had the opposite result. Subsequently they found that, on the one hand, little or no mycelium was produced in cultures started with 2 mgm. per ml. of inoculum and incubated in air, or when 0·2 mgm. per ml. of inoculum was used and incubated in an atmosphere containing 10% CO_2, whereas, on the other hand, a considerable amount of mycelium was produced if only 0·2 mgm. per ml. of inoculum was used and incubated in air.

It was therefore concluded that spherule formation was favoured by increased concentration of CO_2, and this conclusion was confirmed by the results of further cultural experiments, in which mycelium and arthrospores were used as the inoculum, which showed this result. These observations are in contrast to those of CONVERSE and BESEMER [*ibid.*, 1960, v. 57, 71], who found no improvement in spherule yield in 10% CO_2. *C. J. La Touche*

LONGLEY, B. J. & MENDENHALL, J. T. **The Successful Treatment of Pulmonary Coccidioidomycosis with Intravenous Amphotericin B.** *Amer. Rev. Respiratory Dis.* 1960, Apr., v. 81, No. 4, 574–8, 4 figs.

This report concerns a 28-year-old white male residing in Arizona. His symptoms dated from March 1955 and included tiredness and loss of weight.

On 17th June 1955 he presented with a spontaneous pneumothorax associated with pleural effusion. "A closed thoracotomy was performed and fluid was aspirated." Antibiotics were administered during a period of 3 weeks. Despite this treatment the patient relapsed 4 weeks after the onset of symptoms, and it was therefore decided to carry out a left thoracotomy, during which the lower lobe and part of the lingula were removed.

A fistula developed during the post-operative period and *Coccidioides immitis* was grown from the pus in culture.

On 12th September 1955 an empyema cavity was revealed in the apex of the left lung by X-ray examination. Thereupon, adequate drainage was established after resection of part of some of the ribs. Chemotherapy in the form of stilbamidine was then instituted.

The patient was discharged from hospital on 24th October 1956 with a diagnosis of coccidioidomycosis and bronchopleural fistula, but was readmitted in February 1957 for further treatment.

Orally administered amphotericin B was then instituted, and increased up to 2 gm. per day and continued for 2 months. During this period cultures were negative for *C. immitis* whereas they had previously been positive.

On 16th April 1957 intravenous amphotericin B was instituted with beneficial results, and on 1st July 1957 it was considered safe to undertake further surgery. Accordingly a pneumonectomy was performed on the left side, thus completing the previous operation. Subsequently, intravenously administered "amphotericin B was continued three times a week for six weeks", by which time "all skin tests were negative, as was the complement-fixation test for coccidioidomycosis".

The patient was discharged on 30th August 1957 and then continued as an out-patient. However, as the complement-fixation tests remained negative and X-ray examinations revealed no further progress of the disease, the patient was allowed to return to work, some 3 years after the onset of the disease.

C. J. La Touche

TROPICAL OPHTHALMOLOGY

CENTRAL AFRICAN J. OF MED. 1960, June, v. 6, No. 6, 267–70. **Some Facts and Figures on the Survey of African Blindness by the Executive Sub-Committee of the Co-ordinating Committee for Blind Welfare.**

The first step in this survey of blindness in Southern Rhodesia revealed an incidence of only 0·168% of blindness which is less than the 0·2% recorded in the United Kingdom at the present time. Since it was obvious that this was an underestimate further surveys were undertaken which led to a figure of 0·858%. The main cause of blindness was cataract (46%) followed by trachoma (16·9%). Optic atrophy was 6·3% and glaucoma 3·6%.

The authors feel that many blind Africans stay away and will not reveal themselves for the purposes of these surveys until much more curative treatment can be given.

D. P. Choyce

See also p. 1205, McLAREN, **Nutrition and Eye Disease in East Africa: Experience in Lake and Central Provinces, Tanganyika.**

POLLARD, M., STARR, T. J., TANAMI, Y. & MOORE, R. W. **Propagation of Trachoma Virus in Cultures of Human Tissues.** *Proc. Soc. Exper. Biol. & Med.* 1960, June, v. 104, No. 2, 223–5, 2 figs. [12 refs.]

This communication reports the successful cultivation of trachoma virus in human amnion and human synovial cell lines. The inoculum was provided by infected chick embryo yolk sacs. Growth of the virus in the human cells was established by microscopy (Wright plus Giemsa stain and ordinary microscope; acridine orange and fluorescent microscope) and the demonstration of infectivity for the chick embryo by the yolk sac route. 5 serial passages at 7-day intervals were achieved. The virus grew better in the synovial than in the amniotic cells. [See also this *Bulletin*, 1960, v. 57, 848.] *S. P. Bedson*

See also p. 1230, ATIAS *et al.*, Myiasis ocular producida por larvas de *Oestrus ovis*. **[Ocular Myiasis produced by Larvae of *Oestrus ovis*.]**

TROPICAL ULCER

JANSSENS, P. G., QUERTINMONT, M. J., SIENIAWSKI, J. & GATTI, F. **Necrotic Tropical Ulcers and Mycobacterial Causative Agents.** *Trop. & Geograph. Med.* Amsterdam. 1959, Dec., v. 11, No. 4, 293–312, 18 figs. & 3 maps. [14 refs.]

The lesions under discussion are found in an area 10 km. in diameter between the Nzoro and Kibali rivers in north-eastern Congo.

The ulcers occur in miners and villagers, but mostly in children, and chiefly on the legs, often near the joints. They may be single or have smaller satellite ulcers always connected to the mother lesion either by extension or subcutaneous channels.

The initial lesions are of two types. They may be oedematous, slowly developing to a large size and eventually ulcerating or they may appear as circumscribed nodules which break down. They spread into the muscle and bone beneath and lead to vague tissue calcification and sometimes to osteitis and arthritis. Local glands are not involved.

Laboratory studies show no ordinary bacterial pattern, but extracellular acid-fast mycobacteria are found in the necrotic hypodermal areas, either singly or in masses. The deep tissues are usually otherwise free from organisms.

Some patients were found to be sensitive to avian tuberculin, all to *Mycobacterium kasongo*. Most had negative Mantoux reactions which were not converted during the development of the lesions or subsequently. The lepromin test was positive.

Treatment was unsatisfactory, even with antituberculosis regimens. Excision was the best method.

In a very interesting discussion on the aetiological agents involved in the genesis of the lesions the authors consider the possibilities of direct infection and infection plus sensitization. They suggest two possibilities: (1) an unknown agent may produce a non-specific sensitivity which leads to violent reaction upon infection with *Mycobacteria* sp.; (2) mycobacteria may infect the tissues and remain in equilibrium, gradually sensitizing them. Sudden increase in the organisms for some reason could then lead to necrosis.

B. G. Maegraith

MISCELLANEOUS DISEASES

O'CONOR, G. T. & DAVIES, J. N. P. **Malignant Tumors in African Children, with special reference to Malignant Lymphoma.** *J. Pediatrics.* St. Louis. 1960, Apr., v. 56, No. 4, 526–35, 3 figs. [19 refs.]

This article sets out to analyse and comment upon the incidence of malignant tumours in African children as reported by Kampala Cancer

Registry [*Bull. Hyg.*, 1958, v. 33, 1139] in the first 7 years of its existence. The authors rightly point out the inadequacy of such a register to give anything like a complete picture of malignant disease in Uganda. In recent years there is a tendency to assess the frequency of cancer in Africa much higher than formerly and, if this be true (which is not yet proven), there has yet to be determined the vitally important fact as to whether the incidence of cancer is actually rising or whether diagnosis is becoming more accurate.

The register records only cases seen at the Kampala hospitals and confirmed by microscopy. The authors review all malignant tumours recorded as occurring in African children from 0–14 years of age. This comprises 125 cases, and there are another 60 cases without histological proof but with reasonably conclusive clinical and radiological evidence for the diagnosis. The results are compared with American figures (3 series) and the striking differences are in the incidence of malignant lymphomas (48% of total at Kampala and about 12% in America) and leukaemia (5·6% at Kampala and 30% in America). This confirms previous reports of the rarity of leukaemia in African children, and this in spite of the fact that blood smears and large spleens are constantly under review in all African hospitals because of the endemicity of malaria. The suggestion is made that these striking differences in incidence of the two groups represent a true variation in the site of malignant proliferation, and an alteration in the natural history of diseases of the lymphatic system.

Almost half of the tumours in this series were diagnosed as malignant lymphoma. The classification used was that of Gall and Rappaport. The predominant cell is similar to a lymphoblast and these cells are supported by only the most delicate reticulum. Half of these tumours (29) occurred in mandible or maxilla or in both. The neoplasm grew rapidly and often involved both jaws and both sides before death. The disease appeared to commence most often in the region of the lamina dura of the developing teeth. 6 of the patients with these jaw tumours were autopsied and all had extensive intra-abdominal involvement, including lymph glands. The second commonest clinical site of the tumour was abdominal, and of the 20 patients thus presenting 12 came to autopsy and showed the same general distribution of masses as in the "jaw" cases. The tumour was distributed as nodules or irregular masses in many organs, often virtually replacing all normal tissue and showing as soft pink or white tumours mottled with haemorrhage or necrosis. Curiously, the spleen was often spared.

The frequency of the highly malignant lymphoma in African children presenting so regularly in the jaws is obviously an unusual phenomenon and may be related to the strange rarity of leukaemia in the same population. The authors conclude that the remarkable affinity of these malignant lymphomas for the jaws of African children in Uganda suggests a local causative factor but do not go on to elaborate this hypothesis. They say that such tumours have been reported in East and Central Africa, in the Rhodesias, the Congo and probably in West Africa. [9 cases of malignant tumours of jaw in African children are recorded by Rose in the Nixon Memorial Hospital reports in Sierra Leone from 1952–57.] Further epidemiological studies now in progress may define more clearly and perhaps elucidate this problem.

J. R. Rose

STAMPA, S. **Tick Paralysis in the Karoo Areas of South Africa.** *Onderstepoort J. Vet. Res.* 1959, Dec., v. 28, No. 2, 169–227, 7 graphs, 8 figs. & 1 coloured folding map. [Numerous refs.]

A general account of the biology and control of *Ixodes rubicundus*, with reference to tick paralysis in domestic animals and man.

PARASITOLOGY: GENERAL

FLEWETT, T. H. & FULTON, J. D. **The Relationship of *Babesia rodhaini* to the Host Erythrocyte.** *Ann. Trop. Med. & Parasit.* 1959, Dec., v. 53, No. 4, 501–3, 6 figs. on pl.

In a previous study of mammalian parasites (*Plasmodium berghei* and *P. knowlesi*), in thin sections of infected blood examined by electron microscopy, the authors have proved that the parasites were intracellular, and not adhering to the surface of the erythrocytes, as some workers believed them to be [this *Bulletin*, 1956, v. 53, 1211]. In the present paper they describe a similar investigation, in which the same technique was used to determine the position occupied by the rodent piroplasm, *Babesia rodhaini*, in relation to the parasitized red cells in infected mice. Infected blood was fixed in 0·2% osmic acid at *p*H 7·4, centrifuged and embedded in plastic blocks, from which 0·1 mm. sections were cut. These were examined by phase-contrast microscopy, after the plastic was dissolved with xylol and the preparations were mounted, and by electron microscopy.

Examination of the entire cells by the first method and of electron micrographs of their sections provided indisputable evidence of the intracellular position of the piroplasms, whose structure was similar to that of the plasmodia, but lacking the pigment granules. The appearance of *Babesia* within the erythrocytes is shown clearly in a number of electron micrographs.

C. A. Hoare

ENTOMOLOGY AND INSECTICIDES: GENERAL ZOOLOGY

[Papers on the toxic effects of insecticides in man are abtracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

BOORMAN, J. P. T. & SERVICE, M. W. **Some Records of Mosquitoes (Culicidae Diptera) from the Niger Delta Area, Southern Nigeria.** *West African Med. J.* 1960, Apr., v. 9 (n.s.), No. 2, 67–72.

Access to the Niger Delta area is not easy and this is believed to be the first entomological survey in the area.

The vegetation varies from *Rhizophora* mangrove swamp to high forest, although, at high tides, the forest floor adjacent to numerous small rivers

becomes flooded. A high percentage of tree-hole breeders, including *Aëdes aegypti* and *Aëdes africanus*, were found among the 46 species of mosquito recorded. *Aëdes africanus* was taken biting human bait at ground level and 1 specimen was also found in a spray catch indoors. *Anopheles gambiae* was the most common species of *Anopheles*, although *A. funestus* was also found. *Mansonia africana* was the commonest species taken biting man.

B. R. Laurence

OKADA, I. **[Ecological Studies on Mosquito Larvae found in the Basin of the River Hiji]** *Shikoku Acta Med.* 1960, Feb., v. 16, No. 1, 55–75, 1 map & 5 charts. [89 refs.] [In Japanese.] English summary.

During a year, 1954–55, the author studied mosquito larvae in 32 places in the basin of the River Hiji in Ehime Prefecture, Japan. Some 10,552 larvae were studied as a result of collections made 2 or 3 times every 2 months.

Six genera in 21 species were found and their percentage incidences are listed. They included *Anopheles sinensis* (3·47%), *A. lindesayi* (1·72%), *A. edwardsi* (0·08%), *Aëdes albopictus* (27·56%), and *Culex pipiens* (7·14%).

The larvae were comparatively resistant to cold: 1,826 larvae of 11 species survived in December, but in January (maximum temperature below 10°C.) only 8 species survived and the survivors were reduced to one-sixth of the number alive in December: by the end of January only 26 larvae of 4 species were found alive.

In April, when the temperature did not exceed 20°C., *Aëdes* were found to breed in small accumulations of water, and as the fields filled with water, *Culex* and *Anopheles* breeding began. As the temperature rose, increase in breeding was considerable, with a peak in July: it is concluded that a temperature above 20°C. is necessary for the full life cycle to develop.

Mosquitoes bred in the usual small collections of water and also in larger areas such as paddy fields. Control should be undertaken between March and June.

H. J. O'D. Burke-Gaffney

CORBET, P. S., HADDOW, A. J. & GILLETT, J. D. **Observations on the Oviposition-Cycle of *Aëdes* (*Stegomyia*) *aegypti* (Linnaeus), IV.** *Ann. Trop. Med. & Parasit.* 1960, June, v. 54, No. 2, 156–64, 3 figs. [12 refs.]

"1. The oviposition behaviour of *Aëdes aegypti* was studied under non-24-hour regimens of light and dark varying in length from 16 to 28 hours.

"2. Adults maintain a non-24-hour oviposition-cycle as long as they receive appropriate light and dark time-cues. When these time-cues cease or are changed, such a cycle does not persist.

"3. Their ability to adopt a non-24-hour cycle depends on the current regimen and not on larval or previous adult experience.

"4. After adopting a non-24-hour cycle, adults will change quickly to a 24-hour cycle if given appropriate time-cues, but they seem to do so more slowly if, as larvae, they were reared under a non-24-hour regimen.

"5. It is concluded that in the oviposition rhythm the endogenous element is weak and the exogenous element is strong."

BOORMAN, J. **Studies on the Biting Habits of the Mosquito *Aedes* (*Stegomyia*) *aegypti*, Linn., in a West African Village.** *West African Med. J.* 1960, June, v. 9 (n.s.), No. 3, 111–22, 5 figs. [19 refs.]

The biting activity of *Aëdes aegypti* was studied at 9 catching stations in and around the village of Ilobi, some 50 miles north of Lagos, Nigeria, over a period of 2 years, 1955 to 1957. A total of 26,258 mosquitoes were captured: 22,026 of these were *Mansonia africana*, and 948 were *Aëdes aegypti* (254 males, 694 females), all apparently belonging to the type form of this species.

The period of maximum abundance of *A. aegypti* coincided with the rainy season and this species is "virtually absent" in the dry season. Comparison of the catches at the various stations, described as the "biting profile", showed that the population of *A. aegypti* in this locality was confined almost exclusively to the village, and there was no evidence of a forest population.

The activity (biting) cycle from the combined observations from all stations showed two main peaks of activity, at 6.00–8.00 hours and at 16.00–18.00 hours. The peak of morning activity was most marked in male mosquitoes. However, suppression of the morning peak of activity was found at one station in both female and male mosquitoes and the author emphasizes the caution needed in applying results of studies in one locality to conditions elsewhere.

The biting index [this *Bulletin*, 1952, v. 49, 41] from the catches at the different stations indicated that the risk of infection with forest viruses from *A. aegypti* was greatest at the edge of the village, less at the centre of the village, and negligible outside the village. [The author records the seasonal distribution, biting profile and activity cycles as percentages of the total catch. The total catches in different years, and at each catching station, are not given directly, so that it is difficult to estimate the significance of some of these results.] *B. R. Laurence*

MCKIEL, J. A. & CLUNIE, J. C. **Chromatographic Fractionation of the Non-Dialyzable Portion of Mosquito Extract and Intracutaneous Reactions of Mosquito-Bite-Sensitive Subjects to the Separated Components.** *Canadian J. Zool.* 1960, June, v. 38, No. 3, 479–87, 2 figs.

Two-dimensional chromatography, by means of 70% phenol in water and *n*-butanol/acetic acid/water (9:1:4), demonstrated the presence of 12 ninhydrin-staining peptides in dialysed extracts of larvae and adults of *Aëdes aegypti* and adults of *A. atropalpus* and *Culex restuans*. The chromatograms showed that the compounds were qualitatively identical in the three species, and in the larvae and adults of *A. aegypti*. The amino-acids eluted from the chromatograms are listed for adults of *A. aegypti*.

The peptides were separated from *A. aegypti* extract by means of various water-poor solvents, and proved to be inactive when injected by microsyringe into a volunteer sensitized to the bites of *A. aegypti*. Dialysed *A. aegypti* extract with the peptides removed was found to produce a reaction equivalent to that of a mosquito bite when only a small amount, of about 10^{-3} μgm., was injected into a sensitized person. Separation of the extract by means of

water-rich solvents, such as 65% acetone, showed the presence of 4 active fractions, each of which produced a reaction in sensitized volunteers.

A microsyringe for injecting 0·4 μl. with an accuracy of ±10% is described.

B. R. Laurence

WEIDHAAS, D. E., SCHMIDT, C. H. & BOWMAN, M. C. **Effects of Heterogeneous Distribution and Codistillation on the Results of Tests with DDT against Mosquito Larvae.** *J. Econom. Entom.* 1960, Feb., v. 53, No. 1, 121–5.

The authors have continued to investigate problems arising from the use of aqueous suspensions of DDT for larvicide programmes and resistance studies.

In an earlier study [BOWMAN *et al.*, this *Bulletin*, 1960, v. 57, 1121] it was reported that over a 24-hour period more than 50% of DDT was lost from suspensions through co-distillation with the water vapour. In this paper experiments are described which relate the loss of DDT to larval mortality. Equal volumes of 0·007 p.p.m. DDT [a theoretical concentration since, owing to co-distillation and the heterogenous distribution of the insecticide in water, the actual concentration was much less] were placed in jars of equal size. Some jars were left open, others were sealed and some were subjected to a 12 m.p.h. wind. Larvae of *Anopheles quadrimaculatus* were exposed to the insecticide in the jars for 24 hours. Larval mortality was greatest (96%) in the sealed jars, less (59%) in the open jars and minimal (6%) in jars exposed to the wind. Similar experiments with *Aëdes aegypti* did not show any difference in mortality between larvae from sealed and unsealed jars. In explaining this the authors point out that the relationship between the dose absorbed and resulting mortality is not the same for the two mosquitoes and that *A. aegypti* tends to feed along the walls of the test containers where DDT apparently concentrates.

SCHMIDT and WEIDHAAS [*ibid.*, 1960, v. 57, 854] reported that mortality of mosquito larvae increased with the volume of the suspension but decreased with container size. Results of experiments described here indicate that this variation is considerably, although not entirely, reduced by the prevention of co-distillation, *i.e.* by sealing the jars. Since the variation in mortality could not be completely eliminated it was concluded that the association of DDT at the various interfaces as well as its loss by co-distillation affected larval mortality.

Results from other experiments indicate that under normal test conditions the amount of lindane, dieldrin, malathion or parathion lost from suspensions or solutions by co-distillation was insufficient to cause any noticeable change in mortality.

B. C. Fine

FOX, I. La resistencia del *Aedes aegypti* a ciertos insecticidas de hidrocarburos clorados y de fosfato organico en Puerto Rico. [**Resistance of *Aëdes aegypti* to Certain Chlorinated Hydrocarbon and Organo-phosphorus Insecticides in Puerto Rico**] *Bol. Oficina Sanitaria Panamericana.* 1960, May, v. 48, No. 5, 375–82. [13 refs.] English summary.

In connexion with the widespread anti-*Aëdes aegypti* campaigns in the Americas, DDT spraying has been widely practised in Puerto Rico. In 1958,

control failure near the airport at Isla Verde raised suspicions of resistance which has been reported elsewhere in the Caribbean and Central America. A strain was collected and maintained in the laboratory. Larvicide tests were conducted with suspensions prepared from various samples of insecticides, roughly but not exactly in the manner recommended by WHO. Tests on the adults were made by the WHO technique.

The results of the larvicide tests indicated very high levels of resistance to all chlorinated insecticides (DDT, dieldrin, gamma BHC, chlordane), of about 500 times. Reduced susceptibility to organo-phosphorus samples was also indicated (at levels of 4 to 10 times). Tests on adult females gave low mortalities with one-hour exposures to 4% DDT or 1·6% dieldrin.

This appears to be the first record of resistance to both DDT and dieldrin in *A. aegypti*. *J. R. Busvine*

MICKS, D. W., FERGUSON, Martha J. & SINGH, K. R. P. **Effect of DDT on Free Amino Acids of Susceptible and DDT-Resistant** *Aedes aegypti* **Larvae.** *Science*. 1960, May 27, v. 131, 1615, 2 figs.

Previous workers have found that DDT treatment tends to lower the amino-acid level of the haemolymph of normal insects (house-flies; cockroaches). These tests with normal and resistant strains of *Aëdes aegypti* revealed that the only changes of interest were in the alanine content of the larvae. In controls, the level rose up to 4 hours in both strains and then fell. When the larvae were immersed in DDT suspensions (at the LC 50 of each strain) there was slightly higher alanine content in susceptible larvae and a very definite increase in resistant ones. It is not known whether this increase was due to increased alanine synthesis or decreased metabolism.

J. R. Busvine

HAEGER, J. S. **Behavior preceding Migration in the Salt-Marsh Mosquito,** *Aedes taeniorhynchus* **(Wiedemann).** *Mosquito News*. 1960, June, v. 20, No. 2, 136–47, 4 figs. [17 refs.]

PROVOST, M. W. **The Dispersal of** *Aedes taeniorhynchus*. **III. Study Methods for Migratory Exodus.** *Mosquito News*. 1960, June, v. 20, No. 2, 148–61, 4 figs. [11 refs.]

TEKLE, Aseffa. **The Physiology of Hibernation and its Role in the Geographical Distribution of Populations of the** *Culex pipiens* **Complex.** *Amer. J. Trop. Med. & Hyg.* 1960, May, v. 9, No. 3, 321–30. [14 refs.]

In North America, *Culex pipiens pipiens* exists north of 39°N. and *C. p. fatigans* south of 36°N.; in between, either form may be found, or intermediates (which are probably hybrids). The question as to what prevents the extension of *pipiens* towards the south or *fatigans* to the north is unsolved. The possibility that one factor concerned is reduced hibernating ability in *fatigans*, is investigated in this paper.

Strains of *C. p. pipiens* (from near Baltimore) and *C. p. fatigans* (from the Philippines) were compared in regard to the effects of temperature on their

growth, longevity, respiration, fat accumulation and egg production. In both subspecies, lowering the temperature caused slower development, heavier body weight and longer wing span. *C. p. pipiens* developed more slowly than *C. p. fatigans* at the same temperature and was also heavier and larger. At the highest temperature, 35°C., no *pipiens* completed development, while 29% *fatigans* did so; at 10°C., on the other hand, 32% *pipiens* emerged as compared with 5% *fatigans*.

Fat deposits were heavier at low temperatures in both forms, though remaining the same proportions of body weight. Feeding with sugar solution notably increased the fat content, but not to the levels found in wild-caught *pipiens* in winter. Survival at 5°C. was greater after sugar feeding, whereas blood meals did not assist survival.

Both forms consumed more oxygen at high temperatures (and this was apparently not due to increased activity). *C. pipiens* consumed rather more than *C. fatigans* (per mgm. weight), especially after sugar feeding, which raised consumption in both forms.

During hibernation, *pipiens* consumed more of its fat reserves and this enabled it to survive better, since *fatigans* died while still containing considerably more fat.

Broadly speaking, the results support the suggestion that inefficient hibernation restricts the dispersal of *C. p. fatigans* into cooler regions.

J. R. Busvine

PARKER, Anne C. M. & ROZEBOOM, L. E. **The Effect of Temperature and Illumination on Mating of *Culex pipiens pipiens* L. and *C. p. fatigans* Wied.** *Amer. J. Trop. Med. & Hyg.* 1960, May, v. 9, No. 3, 331–5.

The preceding paper deals with the restriction of *Culex pipiens fatigans* to warm regions. This paper concerns the possibility that *C. p. pipiens* is prevented from invading warmer climates by inhibited mating at high temperatures.

The mating of several strains of the *pipiens* complex was studied by keeping colonies in 1 ft. cube cages, at different temperatures, for several days and then determining the proportions fertilized from examination of spermathecae. Comparisons between *pipiens* and *fatigans* showed that the latter was more sexually active at all temperatures and less inhibited at the highest ones (30° and 35°C.). A second trial gave the same relationship, though the actual percentages of fertilization were different. A further comparison of *pipiens* and *molestus* showed the latter to be most active of all, *pipiens* still being inhibited at 35°C. A comparison of two strains of *fatigans* gave very similar results. [No mention is made of stenogamy. The efficiency of mating in small cages in the order *molestus*>*fatigans*>*pipiens* is not unexpected.]

Other tests were conducted in larger cages with gradually varying illumination. It was noted, on several occasions, that decreasing light eventually induced swarming in both *pipiens* and *fatigans*. But whereas *fatigans* began to swarm at low illumination and stopped in darkness, the swarming peak of *pipiens* was in complete darkness.

It is suggested that different mating preferences for temperature and light tend to separate the two sub-species where they co-exist. *J. R. Busvine*

ADAM, J. P., BAILLY-CHOUMARA, H. & ABONNENC, E. Notes écologiques sur quelques Phlébotomes cavernicoles de la région Éthiopienne. [**Ecological Notes on Cave-dwelling** *Phlebotomus* **of the Ethiopian Region**] *Arch. Inst. Pasteur d'Algérie*. 1960, June, v. 38, No. 2, 299–304, 2 figs. on 2 pls.

GRENIER, P. & CLASTRIER, J. Une Simulie saharienne: *Simulium ruficorne* Macquart. [**A Saharan Simuliid,** *S. ruficorne*] *Arch. Inst. Pasteur d'Algérie*. 1960, June, v. 38, No. 2, 329–30.

WOLFE, L. S. & PETERSON, D. G. **Diurnal Behavior and Biting Habits of Black Flies (Diptera: Simuliidae) in the Forests of Quebec.** *Canadian J. Zool.* 1960, June, v. 38, No. 3, 489–97, 3 figs. [15 refs.]

"Studies in the region of Baie Comeau, Quebec, from 1954 to 1956, showed that black flies were most active in the morning 1 to 2 hours after dawn and in the evening ½ to 1 hour before sunset. Flight activity appeared to depend on light intensity if the temperature was not below 45°F., the wind velocity not above 2 m.p.h., and the relative humidity not below 50%. In the morning, activity was greatest at higher levels of light intensity, *i.e.*, 20 ft.-c., than in the evening, 5 ft.-c. Activity increased before thunderstorms and rain and the increase appeared related more to the change in light intensity than to changes in atmospheric pressure or humidity. At night, black flies moved to resting places in the tops of the trees, probably because of the more suitable light intensity at the higher levels just before dark. Oviposition commenced in the late afternoon and continued until dark except on overcast days, when it commenced in early afternoon. *Simulium* (*Simulium*) *venustum* Say bit man mainly on the back of the neck."

CAEIRO, V. M. P. *Culicoides gulbenkiani,* **a New Species of** *Culicoides* **(Diptera Ceratopogonidae) in South Africa.** *Onderstepoort J. Vet. Res.* 1959, Dec., v. 28, No. 2, 155–67, 4 figs. [11 refs.]

BREELAND, S. G. **Observations on the Breeding Habitats of some** *Culicoides* **and other Heleidae in the Panama Canal Zone (Diptera).** *Mosquito News*. 1960, June, v. 20, No. 2, 161–7.

CLASTRIER, J. Notes sur les Cératopogonidés. X. Cératopogonidés de la République du Congo. [**Notes on Ceratopogonidae; X, the Republic of Congo**] *Arch. Inst. Pasteur d'Algérie*. 1960, June, v. 38, No. 2, 258–98, 26 figs. [15 refs.]

WARE, G. W. & TERRANOVA, A. C. **The Effects on House Flies of adding Wheat Germ and Corn Oils to Fly Media.** *J. Econom. Entom.* 1960, Apr., v. 53, No. 2, 325–6.

Very little work has been done with the vitamin E requirements of insect nutrition. HOUSE and BARLOW (*Ann. Entom. Soc. of America,* 1958, v. 51,

299) found that 7 vitamins, *viz.* riboflavine, calcium pantothenate, nicotinic acid, biotin, thiamine, choline and pyridoxine, were dietary requirements of house-fly larvae. BROOKES and FRAENKEL (*Physiol. Zoöl.*, 1958, v. 31, 208) showed that the vitamin requirements were met by adding solutions containing these 7 vitamins together with folic acid and inositol. All the oils, however, reduced the percentage of adults emerging from the media as compared with the control.

To study the influence of vitamin E in insect nutrition, the flies were reared for 8 successive generations on CSMA (Chemical Specialties Manufacturers Assn.) media containing 1% (wet weight) corn oil and wheat germ oil (enriched with vitamin E). Four additional generations were grown on media containing 2% of the oils.

Considerable variations occurred from one generation to the other, but statistical analysis showed them not to be significant. 11 measurements were investigated. Only the percentage hatch and the number of pupae in the 2% media were significantly different from those in the 1% media. As the two differences could be due to chance, the vitamin E ingredients appear to be neither essential nor valuable to flies when added to CSMA larval media.

Values were given as an 80% measure of the precision of any subsequent test. *A. M. Guneidy*

IKESHOJI, T. **Observations on the Retarded Lethal Effect of Lindane and Dieldrin on the Housefly.** *Japanese J. Exper. Med.* 1960, Feb., v. 30, No. 1, 83–7, 1 fig.

Third instar larvae of *Musca vicina* were immersed in 0·05% lindane and dieldrin emulsions for 30 minutes at 30°C., then washed in water and kept so that the subsequent larval and pupal mortalities could be recorded. The total mortalities in the larval stage with lindane and dieldrin were, respectively, 1·83% and 2·5% and in the pupal stage 42·89% and 36·33%.

The amount of insecticide present in larval, pupal and adult house-flies, after this treatment, was estimated by grinding 100–300 individuals with anhydrous sodium sulphate and silica gel and extracting by filtering 60 cc. of acetone, three times within 45 minutes, over the residue. The filtrates were evaporated and diluted again with 4 cc. of acetone, and 1 cc. of this solution was then mixed with 99 cc. of water to make a test suspension. Standard solutions were prepared by mixing acetone solutions of lindane and dieldrin with extracted evaporates of untreated insects. Second instar larvae of *Culex pipiens pallens* were used for the bioassay of the test and standard solutions.

The amount of insecticide 2 days after treatment in larvae and in pupae was found to be 46–49% of the lindane, and 83–97% of the dieldrin, found in larvae immediately after treatment. The corresponding figures for adult flies were found to be 35% of the lindane and 47% of the dieldrin found in the larvae immediately after treatment. It is not known if the decrease in the amount of insecticide is due to detoxication in the flies or removal of chemical from the body surface.

Dieldrin appeared to be absorbed by the larvae more rapidly than lindane during the period of immersion in the insecticide. *B. R. Laurence*

LINEVA, V. A., ABERGAUS, U. Z. & IONOVA, A. I. **[Dry Fly-Poisoning Paper with Chlorophos as an Active Substance in Combating Fly Nuisance]** *Med. Parasit. & Parasitic Dis.* Moscow. 1960, v. 29, No. 3, 330–34, 1 fig. [In Russian.]

The English summary appended to the paper is as follows: —

"Chlorophos—as phosphorus organic preparation intended to control flies—proved to be effective both against the imago and the larvae. In addition to this, it has an odour capable of attracting the flies. Hence, paper-sheets soaked in chlorophos do not need any admixtures of bait.

"The commercial chlorophos includes from 60 to 70% of dimethyl ether of the 1-oxy-2,2,2-trichlorphosphonic acid; 10% of volatile admixtures, containing no phosphorus; 25% of non-volatile substances, with the inclusion of phosphorus.

"Most effective turned out to be fly-papers comprising 50 mg. of chlorophos per 100 cm^2 of paper, their action continuing to be efficacious for 7–8 days, with the water added as the sheets dry out. The flies perish very rapidly, with their greater proportion dying right on the paper or in an immediate vicinity thereof. Owing to the fact that the poisoned flies do not scatter, the fly-papers containing chlorophos may be successfully used domestically and in food industry."

BIGLEY, W. S. & PLAPP, F. W., Jr. **Cholinesterase and Ali-Esterase Activity in Organophosphorus-Susceptible and -Resistant House Flies.** *Ann. Entom. Soc. of America.* 1960, May, v. 53, No. 3, 360–64, 6 figs. [17 refs.]

The enzyme activity of two strains of flies resistant to organo-phosphorus insecticides (malathion and parathion) was compared with that of a normal colony. A colorimetric test measuring residual substrate was employed for assessing both ChE and AliE (cholinesterase and aliphatic esterase).

No difference in ChE activity was found between resistant and normal flies; but the resistant insects had significantly lower AliE activity. This work, which was done without knowledge of the experiments of VAN ASPEREN and OPPENOORTH [this *Bulletin,* 1959, v. 56, 778], confirms their findings.

J. R. Busvine

SUZUKI, T. & SHIRAI, M. **A New Bioassay Method for Insecticide Residues.** *Japanese J. Exper. Med.* 1960, Feb., v. 30, No. 1, 75–81, 4 figs.

"A new bioassay method based on the rapidity of knockdown effect of the house flies was designed for the assessment of insecticide residues. In test series, wooden panels treated by chemicals different hours or days before the testing day were prepared.

"In standard series, various amounts of the chemicals were pipetted on the panels in the same manner as the test series just before the contact tests. House flies, *Musca vicina* Macquart, were exposed to the panels both of the test and standard series. By applying the KT-50's obtained from the test panels to the equations of the lines of log KT-50's and log dosage from the

standard series, the amount of the insecticide residues was able to be detected.

"By this method the residues on the surface of the panels, consequently just available for the insects, could be detected, though its application may be confined to such particular insecticides as DDVP, diazinon, dipterex, malathion et al. which increased KT-50 remarkably when the dosages applied on the panels were decreased."

VAN SOEST, A. H. & VAN THIEL, P. H. **Myiasis in Man in North-East Sumatra.** *Trop. & Geograph. Med.* Amsterdam. 1960, Mar., v. 12, No. 1, 21–5, 1 fig. [15 refs.]

Myiasis is rarely reported from Indonesia. 5 cases are described from Sumatra, 3 of which were caused by larvae of *Chrysomyia*. In 2 cases *C. bezziana* was reared to the adult stage, in one case from suppurating otitis media of the right ear; in the other case 32 larvae were recovered from the nose. The patient with nasal myiasis reported that a fly had earlier penetrated into her nose. *B. R. Laurence*

ATIAS M., A., DONCKASTER R., R., SCHENONE F., H. & OLIVARES, M. Myiasis ocular producida por larvas de *Oestrus ovis*. [**Ocular Myiasis produced by Larvae of** *Oestrus ovis*] *Bol. Chileno de Parasit.* 1960, Apr.–June, v. 15, No. 2, 37–8, 1 fig.

The English summary appended to the paper is as follows:—

"Two mild human cases of ocular myiasis produced by *Oestrus ovis* larvae are reported. Removal of the larvae led to rapid and uncomplicated recovery."

WEYER, F. **Biological Relationships between Lice (Anoplura) and Microbial Agents.** Reprinted from *Ann. Rev. Entom.* 1960, v. 5, 405–20. [94 refs.]

This is a survey of the subject up to April 1959, in which the author emphasizes that normally the bodies of sucking lice are free from pathogenic micro-organisms. Notes on research methods are given, especially the rearing of body lice under laboratory conditions and their experimental inoculation with micro-organisms.

Study of the role of lice as vectors of disease has shown that spirochaetes and rickettsiae may be regarded as true parasites of lice, and there are also non-specific or insufficiently explained relationships between lice and certain other microbial agents, especially bartonellae. The relationships between lice and rickettsiae are then discussed, and this is followed by a section on relationships between lice and the agents of spirochaetal relapsing fevers.

Edward Hindle

THEILER, Gertrud; SALISBURY, Lois E. **Ticks in the South African Zoological Survey Collection. Part IX. "The *Amblyomma mamoreum* Group"** [THEILER & SALISBURY]. *Onderstepoort J. Vet. Res.* 1959, July, v. 28, No. 1, 47–124, 40 figs. & 1 folding map. **Part X. Rhipicephalus mühlensi** [SALISBURY]. *Ibid.*, 125–32, 7 figs. [13 refs.] **Part XI.** *Ornithodoros eboris* **n.sp.** [THEILER]. *Ibid.*, Dec., No. 2, 145–53, 6 figs. [12 refs.]

HAFFKINE INSTITUTE, **Proceedings of the Symposia held during the Diamond Jubilee, Jan. 10 to 14, 1959. V. Symposium on Insecticides** [pp. 94–127, 8 figs. (122 refs.)] 154 pp. 1960. Bombay 12.

This symposium on insecticides, given during the Haffkine Institute celebrations, contains 6 papers, 2 of which—by S. V. Pingale and P. J. Deoras—are given only as abstracts. The titles and authors of the papers are: *Insecticide resistance and public health; the present situation and future prospects*, by J. R. BUSVINE (pp. 94–97); *Mode of action of organophosphorus insecticides as compared to the action of DDT and BHC*, by RAJINDER PAL (pp. 98–107); *The modern conceptions of biological control against the insects*, by A. S. BALACHOWSKY (pp. 108–113); *Problems caused by insecticide resistance in foodgrain stores*, by S. V. PINGALE (p. 114); *Outlook for future*, by P. J. DEORAS (p. 114); and *Investigations on problems of insect resistance to insecticides carried out at the Indian Agricultural Research Institute, New Delhi*, by S. PRADHAN (pp. 115–127). These are reviews of work covered by the titles of the papers and are best consulted in the original Proceedings. *B. R. Laurence*

MULLA, M. S. & AXELROD, H. **Effect of Temperature on Rate of Release of Toxicants from Granules and on Breakdown of certain Insecticides in Water.** *Mosquito News.* 1960, June, v. 20, No. 2, 178–83, 3 figs.

FORD, R. E. **Determination of Dieldrin Deposits on Sprayed Mud Surfaces.** [Correspondence.] *Nature.* 1960, June 18, v. 186, 994.

The Sellotape technique of BARLOW [this *Bulletin*, 1955, v. 52, 942] and silicone grease paper used by ALESSANDRINI [*ibid.*, 1956, v. 53, 821] were not satisfactory because it is difficult for the sticky substance to penetrate into the small depressions on mud surfaces.

The author overcame this difficulty by using solutions containing sodium carboxy-methyl cellulose and glycerol for the formation of an adhesive film *in situ* on the mud surface. The solution is applied to the mud surface mounted on cotton gauze and should be removed as soon as the solution is dry. The formed film is separated from the cotton by soaking in cold water. The

resulting solution is treated with sodium hydroxide and potassium permanganate to ensure the complete extraction of the insecticide. Excess permanganate is removed and the insecticide is extracted from the mixture with a suitable solvent and then determined by any convenient method.

This technique was satisfactorily tested in the laboratory on a number of different types of mud and was adequate to demonstrate sorption as well. It was not, however, tested on muds which give a very loose and friable surface.

A. M. Guneidy

ASCHER, K. R. S. **A Review on "Resistance-Induced Enhanced Susceptibility" in Insects, with some Notes on Similar Phenomena (especially "Collateral Sensitivity") in Microorganisms.** Reprinted from *Arzneim.-Forschung.* 1960, v. 10, 450–61. [Numerous refs.]

i. SCHRADER, G. **Development of the Bayer Product "S 1752".** *Höfchen-Briefe.* 1960, v. 13, No. 1, 1–13, 3 charts. [Refs. in footnotes.]

ii. JUNG, H. F., KÜKENTHAL, H. & TECHNAU, G. **Baytex (S 1752, Bayer 29 493), a New Hygiene Insecticide from the Group of Low-Toxic Phosphoric Esters.** *Höfchen-Briefe.* 1960, v. 13, No. 1, 13–44, 11 figs. (4 coloured). [20 refs.]

i. Some time ago the Bayer company marketed the insecticide Metasystox (demeton-O-methyl), largely for agricultural use; its employment in medical entomology is somewhat limited by a high mammalian toxicity. Professor Schrader's paper describes experimental variations of the demeton molecule and tests of changes in insecticidal action and toxicity. The final product was S 1752 or Baytex, with high insecticidal power and only moderate mammalian toxicity. (Acute oral LD 50 for rat=250 mgm./kgm., *i.e.* about equivalent to DDT.) The paper gives some chemical and physical data, showing good stability in the presence of alkali and a volatility about 3 times that of parathion. Ultra-violet and infra-red spectra are given and some details of metabolic paths in plant tissue.

ii. Laboratory tests on Baytex confirm its low toxicity to vertebrates as compared with insects. Thus, fish (*Lebistes*) survived 48 hours at 1 p.p.m., whereas mosquito larvae (*Aëdes* and *Culex*) were all killed in 24 hours at 0·01 p.p.m. Other laboratory tests show a wide range of action against different insects [though it is difficult to assess these tests without comparable data for other insecticides]. Experiments in which mud blocks were sprayed and stored before exposing mosquitoes to them showed that rates of 1–2 gm. per m.^{2} persisted for 3 to 4 months. Since Baytex is a liquid, the material for practical use is a wettable powder containing 40% active principle on an absorbent carrier.

Field trials in the Congo, in South America and Germany indicate an effective control of mosquitoes (*Culex fatigans, Anopheles albimanus,* etc.) for 5 to 6 months. Field trials on house-fly control suggested that strains resistant to chlorinated insecticides could be controlled for 8 to 10 weeks by Baytex.

J. R. Busvine

BOOK REVIEWS

HUNTER, George W. [Ph.D.], FRYE, William W. [Ph.D., M.D., Sc.D.(Hon.)] & SWARTZWELDER, J. Glyde [Ph.D.]. **A Manual of Tropical Medicine.** 3rd Edition. pp. xxx + 892, 323 illustrations (8 coloured). 1960. Philadelphia. London: W. B. Saunders Co., Ltd., 7, Grape Street, W.C.2. [£5 5s.]

This is the third edition of the *Manual* of which the last edition was edited by MACKIE, HUNTER and WORTH [this *Bulletin*, 1954, v. 51, 1320]. With its 892 pages it may be classed among the larger volumes of tropical medicine and it has been written prinicipally with the needs of American medical officers in mind. This, the third edition, has been enlarged by inclusion of sections on tuberculosis, adenoviruses, ECHO viruses, visceral larva migrans, alveolar hydatid disease, kwashiorkor, tropical eosinophilia, interstitial plasma cell pneumonia and *Trypanosoma rangeli*.

The information contained is with but few exceptions detailed, one of those exceptions being "Tropical macrocytic anaemia" which is dealt with in only 4 lines. As is to be expected in a volume composed of sections by 33 contributors, the standard of the sections varies and those dealing with diseases of the Americas tend to be more authoritative than those on the primarily African and Asian diseases. Thus, for loiasis, it is stated that after the initial course of treatment with diethylcarbamazine, "it is probably desirable to give one or two additional courses to ensure eradication of the infection". Most observers would agree that if loiasis is indeed being treated with diethylcarbamazine, one course is sufficient and the necessity for several courses would cause one to question the diagnosis.

The book is very well illustrated and there is a useful appendix on diagnostic laboratory methods. It is authoritative, up to date, and the clarity of the presentation of the material is outstanding. It may be strongly recommended as a reliable textbook. *A. W. Woodruff*

ADAMS, A. R. D. & MAEGRAITH, B. G. **Clinical Tropical Diseases.** 2nd Edition. pp. x + 540, 72 figs. 1960. Oxford: Blackwell Scientific Publications Ltd., 24–25 Broad Street. [52s. 6d.]

This is the second edition of a book which has been widely accepted as an easily readable textbook of tropical medicine [this *Bulletin*, 1953, v. 50, 1108]. The authors have retained the unusual arrangement of an alphabetical order. This is not unattractive, although to present ainhum as the first tropical disease and to describe blackwater fever before malaria is somewhat bizarre. Under each heading, after the preliminary treatment of the aetiology and geographical distribution, the pathology of the disease is very well described, following which are exceptionally clear accounts of the clinical manifestations. In these the authors have achieved considerable success in presenting the general picture adequately, without complicating the description by numerous variations. The reader is thus able to appreciate the subject without difficulty and this makes the textbook ideal for a post-graduate student preparing for a higher examination and for the clinician embarking on a new field of practice. The treatment of the disease is well set out and in general is that accepted at

the present time although occasionally it is somewhat conservative. There are a number of good illustrations.

The differing reactions of the human hosts to *Entamoeba histolytica* are reflected in the divergences of practice which persist in the treatment of amoebic dysentery. Statistics are difficult to interpret and no doubt much depends on the patient's response to his environment during treatment. Nevertheless few will agree with the continued use of retention enemata of chiniofon or the use of emetine bismuth iodide at 8-hour intervals as advocated by the authors. The indications for surgical drainage of a hepatic abscess are not given and chloroquine is given for only 6 days instead of 14 to 21 as generally recommended.

Blackwater fever is well described but the aetiology would be more clearly dependent on sensitization if the rare cases exhibiting haemoglobinuria in a first attack of malaria (associated with a very high degree of parasitaemia) were considered as suffering from hyperinfection rather than true blackwater fever. In the causes of death from blackwater fever anaemia is not listed as such, although this may be deduced as necessary for the production of renal ischaemia and is described under malaria on p. 192. No reference is made to the apparent success of cortisone in preventing further waves of haemolysis.

In the aetiology of leprosy the authors adhere to the traditional view of the relative resistance of adults although this has recently been questioned.

Leptospira canicola as an infection of pigs and a hazard to farmers might be mentioned although the frequency of this in the tropics has not been determined. It is implied that antibiotics given early are beneficial although this is still *sub judice*.

Malaria is very well described but a rather surprisingly cautious attitude is adopted towards the acceptance of a persistent exo-erythrocytic phase of *Plasmodium malariae* and *P. ovale* infections. It is not made clear that cyanosis due to an 8-aminoquinoline is due to methaemoglobin in the red cells and with reasonable caution most authorities would not consider this cyanosis as an indication to stop the drug.

Are the authors right in referring to the "relatively rare" anaemia of heavy hookworm infections [p. 252]? In the description of tick-borne relapsing fever it might be made clearer that jaundice may occur in severe attacks and that the neurological complications usually follow repeated relapses. There is a good chapter on snake bite but under the examination of the snake it should be made clear that the Elapidae and Hydrophiidae belong to the family Colubridae. The severe headache and occasional delirium of tick-borne typhus are not recorded and there is only a brief reference to the disease in Africa and its relationship to the keeping of dogs as pets. Undulant fever is incorrectly said to be rare under the age of 15 years and enlargement of the spleen is less frequent than implied. The treatment advocated is at variance with current practice and with WHO recommendations in which a combination of tetracycline and streptomycin with the possible addition of a sulphonamide is prescribed. In diagnosis the pitfall of cross-agglutination produced by cholera vaccination is not mentioned. In the section on virus diseases, encephalitis in babies after the use of the 17D strain of yellow fever vaccine is not recorded or the usual advice to postpone vaccination for this reason until the age of 9 months and, where smallpox vaccination is required in addition, to obtain the

yellow fever vaccination first. In the section on helminths, now that piperazine salts and dithiazanine iodide are available the older inefficient drugs used for threadworms should be omitted. It is to be hoped that the single-dose treatment of yaws is successful more often than the authors believe.

The following printing errors were noted:—p. 51, perinaeum; p. 76, incubated for incubation; p. 122, eodema; p. 185, glands for glans; p. 190, merozites for merozoites; p. 191, hoematin for haematin; p. 326, epidermatophytosis for epidermophytosis; p. 494, halzoum for halzoun; p. 509, aspired for aspirated.

In a book so full of good material it has only been possible to draw attention to a few points which might be altered in a later edition, which will surely be demanded and in which perhaps a section on anthrax might be included. This book can be thoroughly recommended. *Frederick J. Wright*

BOWESMAN, Charles [O.B.E., B.A., M.D., F.R.C.S.E., F.A.C.S., D.T.M. & H.]. **Surgery and Clinical Pathology in the Tropics.** pp viii + 1068, 321 figs. 1960. London. Edinburgh: E. & S. Livingstone Ltd., 16–17, Teviot Place. [£5 10s.]

Western medicine is now almost universally accepted as the most rational means of dealing with the ills that inflict the human body and it is to modern Western textbooks that a practitioner naturally turns when faced with a difficult situation.

If he is working in a developing country in the tropics it is then that he discovers that his standard textbooks contain scant reference to the tropical infection which may complicate his surgical cases or to the gross pathology which those who have never left Europe regard as belonging to the last century or earlier. Frequently, too, he will be on his own and have no senior colleague to turn to for advice.

Bowesman has now provided a textbook whose sole aim is to meet this situation and it is noteworthy that this is the first book of its kind to appear for over 30 years.

Strictly tropical conditions are mainly chronic, giving time for investigation; it is the emergency that faces the isolated practitioner, with gross pathology due to delay and with a background of chronic malaria, helminthiasis, chronic pyelonephritis and anaemia. Full weight is given in this book to all these considerations, with emphasis on the commoner major non-traumatic emergencies—acute retention of urine, obstructed labour, ruptured uterus, strangulated hernia and other forms of intestinal obstruction. Where else will one find advice on the treatment of a nine-day old Richter hernia with impending gangrene of the overlying skin?

While the main emphasis refers to practice in West Africa, extensive references to the literature lead to the inclusion of conditions found elsewhere in the tropics.

Differences in experience are inevitable; for example, in East Africa, guinea-worm is not seen, sickle-cell crises do not seem to enter the surgical wards, *Ascaris* seems to be less willing to puncture the small intestine, and keloids, though not uncommon, are not the same problem in the Bantu as they are in the Negro.

The author recommends transverse lower abdominal incisions in women mainly to avoid keloid formation but even where this is not a problem they can be recommended for the excellent access they give, their physiological healing and post-operative comfort. Incisions in Langer's lines should also be used over the appendix and for the approach to inguinal herniae—the latter centred over the internal ring. Other differences in opinion and emphasis are bound to be noted but these do not detract from the general value of the book. Perhaps, however, three other points should be mentioned: polyvinyls should no longer be recommended (p. 829), Dextraven being a dextran and not a polyvinyl (p. 846) is safe and valuable: "Vaseline" is a proprietary preparation whose makers are very sensitive about the indiscriminate use of the word; air-conditioning is very pleasant but package units increase anaesthetic explosion risk.

The standard of illustration is very high and the index excellent, which is as well as there appears to be a lack of systematic arrangement of the chapters and particularly within the vast 210-page chapter on abdominal surgery.

One is left with the impression that this is a book which fills a very real need but that drastic pruning would have made it easier to read, easier to refer to and more within the range of the pocket of those for whom it is intended.

W. G. Kerr

SHEPARD, Harold H. [Editor.] **Methods of Testing Chemicals on Insects. Vol. II.** pp. iii + 248, illustrated. 1960. Minneapolis 15: Burgess Publishing Co., 426 South Sixth Street, Minn. [$5.00.]

While the first volume of this series [this *Bulletin*, 1960, v. 57, 320] was mainly concerned with techniques for assessing the effects of chemicals on the basic physiological processes of insects and with laboratory methods of exposing insects to toxic chemicals, the second volume deals for the most part with screening methods employed in the selection of candidate insecticides for specific purposes.

Of the 13 articles in this volume, the first 3 are devoted to considerations of the effects of various factors on the toxicity of insecticides to insects as they apply before, during and after application of the insecticides. Such variables include temperature, humidity, nutrition, population density, age, stage and sex of the insects, etc. Numerous examples are given, mostly involving agricultural pests. Some discussion is also given of the difficulties in determining the end-point in assessing the effect of insecticides.

The remaining 10 articles deal with screening methods. The first of these considers testing methods involving the addition of chemicals to the medium in which the insects develop. These methods apply to such pests as dipterous maggots and insect pests of stored products.

An article on the screening of space sprays against flies and cockroaches involves discussion of standardized methods such as the Peet-Grady chamber and smaller test chambers, and the use of pressurized dispensers for the production of aerosols.

Soil insecticides are dealt with under 3 headings: residuals, fumigants, insecticidal dips and drenches, while the proofing of textiles against insect

damage involves discussion of the different standardized methods employed in different countries.

Repellents form the subject of a separate article and screening methods against such insects as mosquitoes, flies, fleas, ticks and chiggers are enumerated. Repellents for use on crops, in the household, on stored products and on timber against termites are also considered. The insect-proofing of food-packaging materials, either by the use of repellents or residual insecticides, is dealt with in another article.

Chemical attractants are classified into 3 groups: essential oils and resins, fermentation products, *e.g.*, alcohols, esters, etc., and protein and fat decomposition products. The evaluation of attractants involves feeding and conditioning methods, the use of olfactometers and baiting methods.

The testing of acaricides involves special methods for the rearing, handling and counting of very small arthropods.

The external application of chemicals to animals in the screening of animal sprays, dusts, dips and dressings forms the subject of a further article, and the final section deals with the subject of systemic insecticides as used against livestock insects. Though these systemic insecticides are particularly important against the cattle grubs (*Hypoderma* spp.), it is not easy to use these as test insects as they cannot be reared away from the normal hosts. The approach has been made to use other host-parasite relationships, *e.g.*, by feeding *Cimex, Stomoxys, Aëdes, Pediculus,* etc., on treated rabbits, by exposing cattle grub larvae to chemicals mixed with *in vitro* media in which the larvae live for a few hours or by *in vivo* tests in which first instar larvae of cattle grubs are transplanted into laboratory animals. Newer laboratory techniques now involve the use of guineapigs and screw-worms, ticks and stable flies, mice and *Aëdes* mosquitoes, and rabbits and ticks.

This second volume, then, concentrates on the practical side of screening chemicals for insecticidal activity, and as such gives an insight into the variety of methods involved in the never-ending search for more efficient methods of combating insect pests. Again the medical side of applied entomology remains somewhat neglected. *G. Davidson*

CASTELLANI, Aldo [M.D., F.R.C.P.]. **Microbes, Men and Monarchs. A Doctor's Life in Many Lands. The Autobiography of Aldo Castellani.** 287 pp., illustrated. 1960. London: Victor Gollancz Ltd., 14, Henrietta Street, Covent Garden, W.C.2 [25s.]

In this book with its alliterative title Professor Castellani narrates some of the story of his varied life in many countries in a direct and easy fashion. In the first chapters he gives some account of his childhood and boyhood in Italy, his medical training in Florence, Bonn and at the London School of Tropical Medicine, and of his experiences in Uganda. From 1903 to 1915 he was in Ceylon where he spent " the happiest years of my life " as Professor in the Medical College of Colombo and Director of the Bacteriological Institute.

In a revealing chapter on his practice in Harley Street (1920–1940) which he found of absorbing interest for it enabled him to " combine practical work with scientific research ", he tells stories of his famous patients.

A whole chapter is devoted to Mussolini who in 1925 became the "most interesting patient I ever had".

The Second World War and the declaration of war between England and Italy on June 10th 1940 brought him the difficulties of divided loyalties for "I love England, but I am a son of Italy". Nevertheless, he was enabled to leave England by means which are described. There is an account of experiences with the Italian Medical Service in North Africa.

The later chapters contain an account of the author's escorting the Queen of Italy into exile after the plebiscite in Italy in 1946; his experiences in Switzerland, Italy, Spain and Morocco; and in Portugal which since 1946 has been his permanent home.

There are two appendices, one of which gives the author's views on climate and its influence and another is on medical aspects of the Ethiopian campaign of 1935.

This is the very readable, interesting and entertaining autobiography of a remarkable man. Written in straightforward language without any fine writing it carries one through many lands and many years, telling of his ceaseless activities and with many comments and anecdotes of people he has met. His medical experiences naturally are prominently recorded throughout these pages, and with zest. "Medicine has been my passion and my life, and for many years I have humbly laboured in both fields of it, practice and research."

M. E. Delafield

BOURNE, Geoffrey H. [Edited by] & WILSON, Eileen M. H. [Assistant Editor]. **World Review of Nutrition and Dietetics.** pp. viii + 272, illustrated. 1959. London: Pitman Medical Publishing Co. Ltd., 39, Parker Street, W.C.1. [60s.]

This is the first volume of a new series that is to be produced annually under an editor distinguished for his work in nutritional research, with an international panel of eminent Advisory Editors of six different countries. The editors intend to provide for more lengthy and discursive reviews than are published in conventional journals, each one written by an expert in his particular field. The present volume has papers from the United Kingdom, the United States, France, Japan, and Guatemala.

Professor E. V. MCCOLLUM of Johns Hopkins University, writing on *The History of Nutrition* (pp. 5–27) reviews the growth of knowledge, from primitive man's ideas about foods, to the increasing pace of progress over the past 60 years. This general introduction to the more specialized papers which follow covers the whole field of nutrition. He concludes that this newly gained body of facts represents the greatest achievement in the history of preventive medicine, and that dietetics ranks with immunization against contagious diseases, sanitation, and quarantine, as a health measure.

M. BÉHAR, R. BRESSANI, and N. S. SCRIMSHAW of the Institute of Nutrition of Central America and Panama, contribute a paper: *Treatment and Prevention of Kwashiorkor* (pp. 77–101). While the fundamental aetiological factor in kwashiorkor is described as a marked deficiency in the amino acids necessary for protein metabolism caused by dietary protein deficiency, the authors

emphasize the importance of stress factors, such as infections, particularly infectious diarrhoea, to which the child on an unbalanced diet is highly susceptible. They note a tendency to a faulty attribution of mortality of young children fundamentally caused by protein malnutrition, to parasitism and infection. Anybody aware of the frequency of sudden deaths associated with worming of children for *Ascaris* in parts of Africa, will read of similar deaths in Central America, attributed here to kwashiorkor, with more than passing interest. The principles of treatment of the clinical case are fully stated, and there is an account of the possibilities of increasing protein supplies and the principles of prevention.

Papers immediately related to tropical practice are *Nutritional Factors in Anaemia* (pp. 149–175) by G. R. WADSWORTH, of the London School of Hygiene and Tropical Medicine, and *The Nutritional Requirements of Embryos and the Repercussions of Deficiencies* (pp. 233-263) by A. GIROUD of the Faculté de Médecine, Paris. No one who reads Dr. Giroud's paper will suppose that the requirements for a maternity service are wholly met by the provision of midwives and maternity homes. Other papers are concerned with the sex hormones and protein metabolism, biosynthesis of vitamin C, basal metabolism in the Japanese population, neoplasia and nutrition, and the use of isotopes.

This book will be invaluable to those who wish to keep abreast of the results of recent research in the science of nutrition. *T. P. Eddy*

JOPLING, W. H. [M.R.C.P., D.T.M. & H.] **The Treatment of Tropical Diseases.** pp. vii + 202. 1960. Bristol: John Wright & Sons Ltd. [20s.]

The author of this book has set out to provide up-to-date information for practitioners in both the tropics and the temperate zones on the treatment of diseases acquired in hot countries, and has succeeded in presenting a clear, concise account of the modern therapy and drug prophylaxis of more than 100 conditions in a handy volume of little more than 200 pages.

As far as possible, the diseases are arranged in alphabetical order within aetiological groups. Descriptions of drug treatment include precise details of dosages and administration, with accounts of toxicity and side effects and the measures to combat them. Details are given of general management when this is of particular significance, as in bacillary dysentery and cirrhosis, and include measures to be adopted in the event of complications.

The style is necessarily didactic rather than discursive, and recommendations for the use of modern drugs are supported by references. On the ever-controversial subject of amoebiasis, the two leading régimes (emetine, and antibiotics plus other drugs) are closely described, without an attempt to assess their merits. The sections on the treatment of malaria and leprosy are particularly lucid, comprehensive and up-to-date.

The mass treatments of filarial infections, treponematoses, bacillary dysentery and amoebiasis (but not trypanosomiasis or schistosomiasis) are briefly discussed.

The author has assumed a fair knowledge of aetiology and pathology on the part of the reader, as in the sections on larva migrans and tropical eosinophilia. In the same way, the reader is largely left to rationalize for himself the treatment of amoebiasis.

The book is completed by 7 appendices containing much valuable information, including notes on immunization, the management of the febrile patient, and an assessment of the role of corticosteroids in tropical medicine.

In all, Dr. Jopling has carefully sifted a great deal of literature and, by discarding time-honoured but out-dated material, he has produced a reliable and very useful modern reference book. Its value to the tropical practitioner would be increased by a more liberal interpretation of the term "tropical diseases". The next edition would be made even more useful than the first by including sections on tinea, tetanus, tuberculosis and cerebrospinal meningitis with special reference to tropical practice. *A. J. Duggan*

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PUBLIC APPOINTMENTS

Medical Research Council

Bacteriologist or Virologist required for Trachoma Research Unit in Gambia, West Africa, to take part in clinical, microbiological and epidemiological investigation of trachoma and related eye diseases. Opportunities for individual research on problems arising from this study.

Appointment initially for one tour of approximately 18 months plus accrued leave (at rate of one week for each month served abroad), but possibility of longer tenure.

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Detailed applications, giving names of two referees, to Dr. L. H. Collier, Lister Institute, Chelsea Bridge Road, London, S.W.1.

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